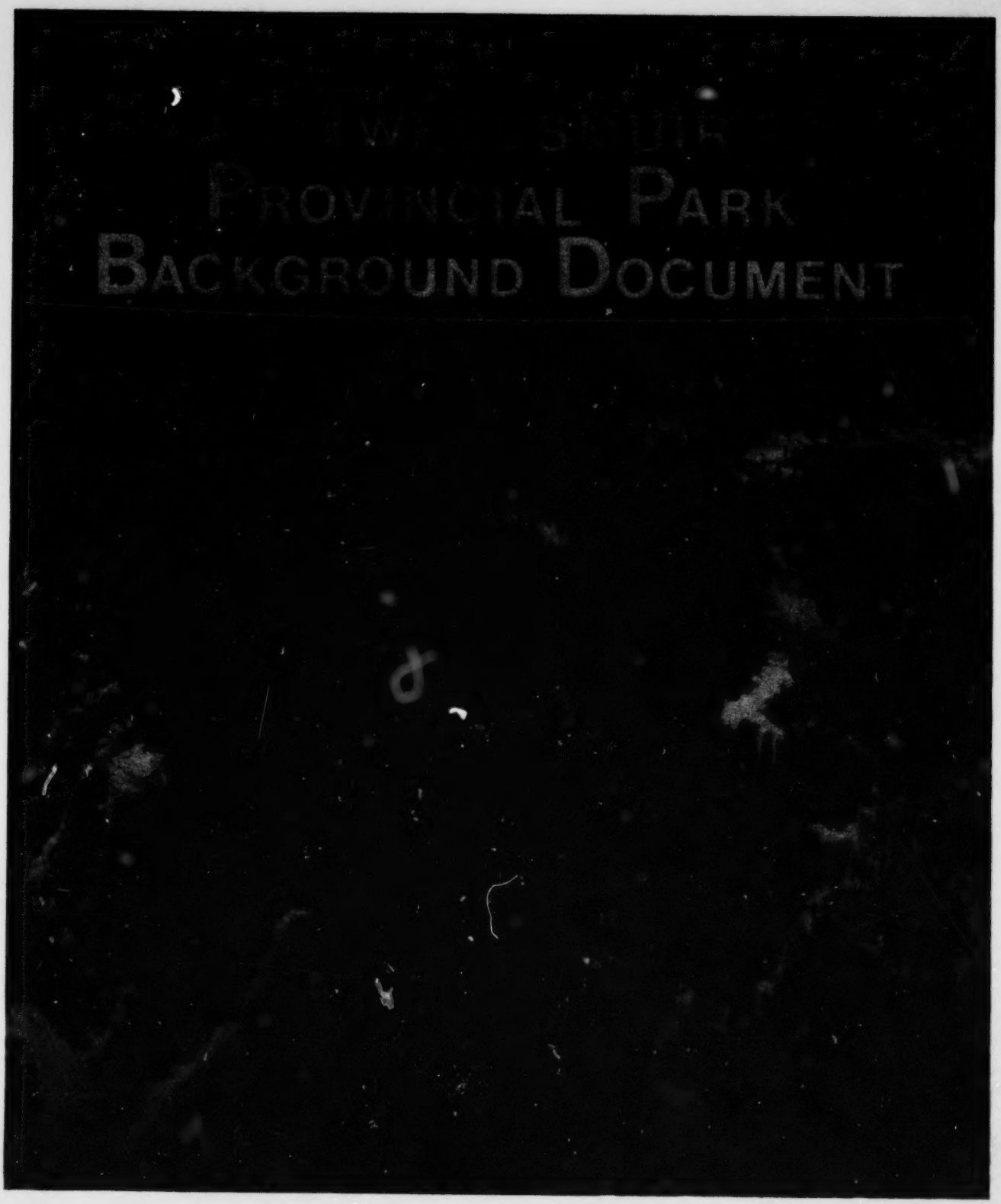
[illegible] Provincial Park
Background Document



Province of British Columbia

Ministry of Environment and Parks

September 1986

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ADDENDUM TO TWEEDSMUIR BACKGROUND REPORT

The following sections of the report are amended by the changes in park status announced by the Minister.

1) Introduction (page 1)

- Most of the park will become Class A parkland and closed to resource development including mining and logging. No staking of mineral claims would be permitted.

- Recreation Area status will be placed over: i) existing mineral claims in the Mount Preston and Tesla areas, ii) an area of mineral potential in the Chikamin Range, iii) the south shore of Ootsa and Whitesail Lakes, an area of the park that was significantly reduced in value with the development of the Alcan Kemano project, and iv) a new addition to the park in the Rainbow Range. Mineral exploration would be permitted in each of the above.

2) Regional Landscapes (page 19)

- The addition to the Rainbow Range will incorporate the full range of characteristics of the Central Interior Shield Volcanoes.

3) Mineralization (page 54)

3a) Existing Claims (see also Figure 5A) - mineral exploration would be permitted in the Mount Preston and Tesla Lake areas. Initially access for mineral exploration would be by air only.

3b) Mineral Potential Areas - Chikamin Range, Ootsa Lake and Rainbow Range Recreation Areas are presently unstaked and will become available for claim staking and evaluation. All would be accessed for mineral exploration by air only.

4) Logging

Small areas of timber in the Ootsa Recreation Area may be available for low impact logging where it is necessary to enhance recreation values. No logging would occur in the small recreation areas established for mineral interests.

NORTHERN B.C. REGION

PARKS AND OUTDOOR RECREATION DIVISION

TWEEDSMUIR PROVINCIAL PARK

BACKGROUND DOCUMENT

September 1986

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PREFACE & ACKNOWLEDGEMENTS

This report comprises a complete biophysical, cultural and legal summary of Tweedsmuir Provincial Park in west central British Columbia. It is intended as a background report to accompany the Tweedsmuir Park planning process. Information presented is focused on the land within Park boundaries, but some information is presented for the surrounding areas when relevant, as in the section on cultural resources.

The report opens with a general description of the Park, and then in turn considers the Park's natural, cultural and visual resources: sub-topics include the climate, geography, flora, wildlife and fish, under 'natural resources', and archaeology, early exploration and settlement history phases, under 'cultural resources'. The subsequent sections of the report cover the existing legal tenures within the Park, such as mining claims, guiding and trapping territories, private land ownership and park use permits. Existing developments, a market analysis, bibliography and finally appendices containing details of material presented earlier are presented towards the end of the report.

This report was prepared for the Northern B.C. Region of the Parks & Outdoor Recreation Division, B.C. Ministry of Environment and Parks. All phases of research and writing of this report were carried out by CLIFF BANCROFT, acting as a private contractor.

Acknowledgements are due to many individuals for assistance in the research side of this report, and in particular to:

Dr. Jim Pojar, Ministry of Forests;

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Don Esselmont, North By Northwest Tourism Association of B.C.;

and numerous employees of the Ministry of Environment & Parks.

1.0 INTRODUCTION

Tweedsmuir Park, covering an area of over 981,000 hectares, is the largest provincial park in British Columbia. It occupies a position in the west-central part of the province, including parts of the Coast Range Mountains in the west and south, and the Interior Plateau to the east and is bounded to the north by the Ootsa-Whitesail Lakes reservoir. The Park's location in relation to the Province of B.C. and its major communities and highways is shown in Figure 1.A.

The Park was named after the 15th Governor-General of Canada, John Buchan, Baron Tweedsmuir of Elsfield. The Governor-General travelled extensively by float aircraft and horseback in the area in 1937, and later said of the Park: "I have now travelled over most of Canada and have seen many wonderful things, but I have seen nothing more beautiful and more wonderful than the great park which British Columbia has done me the honour to call by my name."

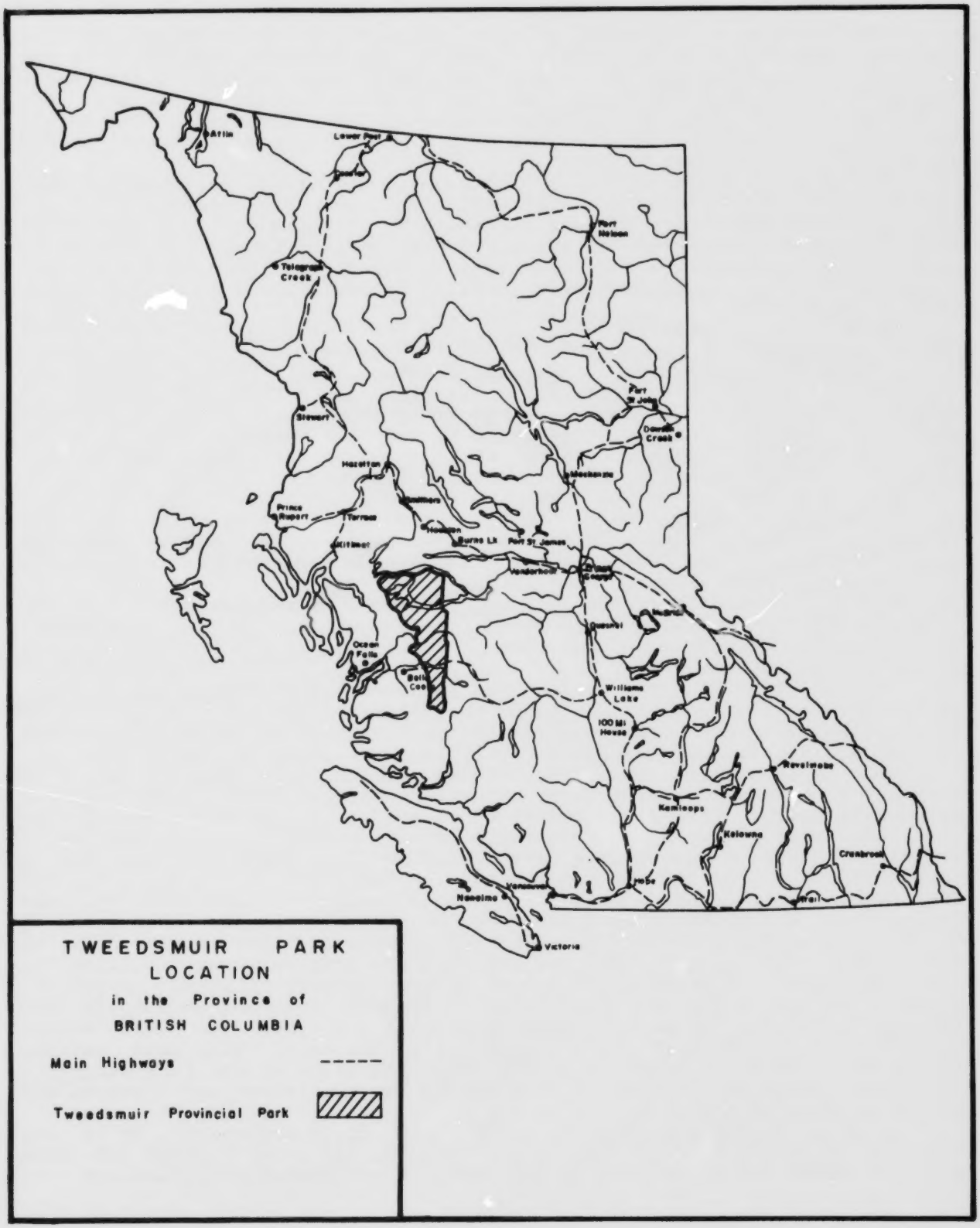
As originally established in 1938, the Park, at 1,396,000 hectares was one of the largest in North America and included the "Great Circle" lakes of the Ootsa-Whitesail-Eutsuk system. In 1940, with the introduction of the Class A, B & C provincial parks classification system, Tweedsmuir was established as a Class B Park. In the early 1950's, though, the Aluminum Company of Canada's Kemano Project led to the enlargement and linking of the Ootsa-Whitesail lakes system as part of a hydroelectric scheme on the Nechako River drainage. By 1955 the Kemano Project was largely completed, and what had been large natural bodies of water with interconnecting streams became a wasteland of drowned trees and rotting driftwood. To retain these flooded areas in the Park was undesirable, and in 1956, by Order-In-Council #2763 (See Appendix 9.1), Tweedsmuir Park was redefined to the boundaries that exist today. Although the Park was reduced in area by almost 400,000 hectares it was extended southward to include the scenic and historic Atnarko Valley and Lonesome Lake, and part of the significant Rainbow Range. Figure 1.B shows both the original 1938 Park boundary and the present Park boundary.

In 1967 and 1970 the Eutsuk and Rainbow Nature Conservancies were established to preclude core areas of the Park from mineral exploration as was permissible under Class B Park designation. These Conservancies are 254,669 and 49,331 hectares respectively, and are shown in Figure 1.C.

Both as originally conceived, and as presently designated, the Park encompasses a wonderful variety of natural features. In the words of Lord Tweedsmuir again: "its five thousand square miles contain some of the loveliest lakes, rivers and mountains on the continent; it shows every variety of North American game except the mountain sheep; it provides a happy hunting ground for the sportsman, the fisherman, the naturalist and the mountaineer." The western sections comprise portions of the spectacular Central Mainland Coast Range Mountains where ice-laden peaks up to 3500 meters are dissected by U-shaped valleys and lake systems down to 300 meters. The eastern sections are a sharp contrast, with rolling to flat topography. Between the two areas are transition zones comprising elements of both areas but interrupted by isolated mountain monadnocks and extinct volcanoes. Climate is equally diverse, varying from humid marine conditions in the west to dry continental in the east. With this extreme variation in physical conditions, the flora and fauna of the Park exhibit a remarkable range and diversity, enhanced by the remoteness and "unspoiled" nature of much of the Park.

Although Tweedsmuir Park has never been easily accessible, it is now possible to drive to the Park along the partly-paved Highway 20 from Williams Lake, 360 kilometers to the east. A twice-weekly bus service

FIGURE I.A



TWEEDSMUIR PARK
LOCATION
in the Province of
BRITISH COLUMBIA

Main Highways -----

Tweedsmuir Provincial Park

FIGURE 1.B

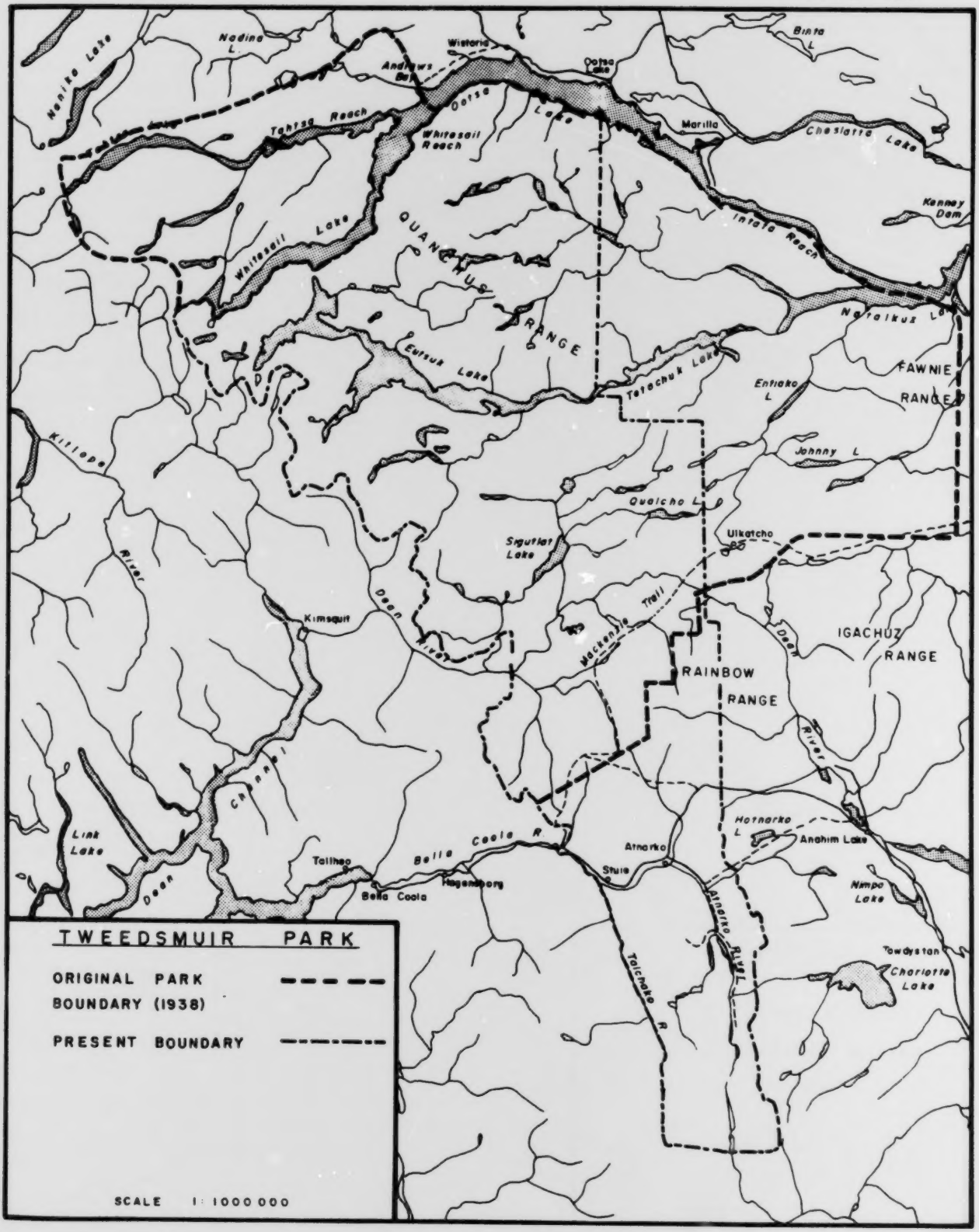
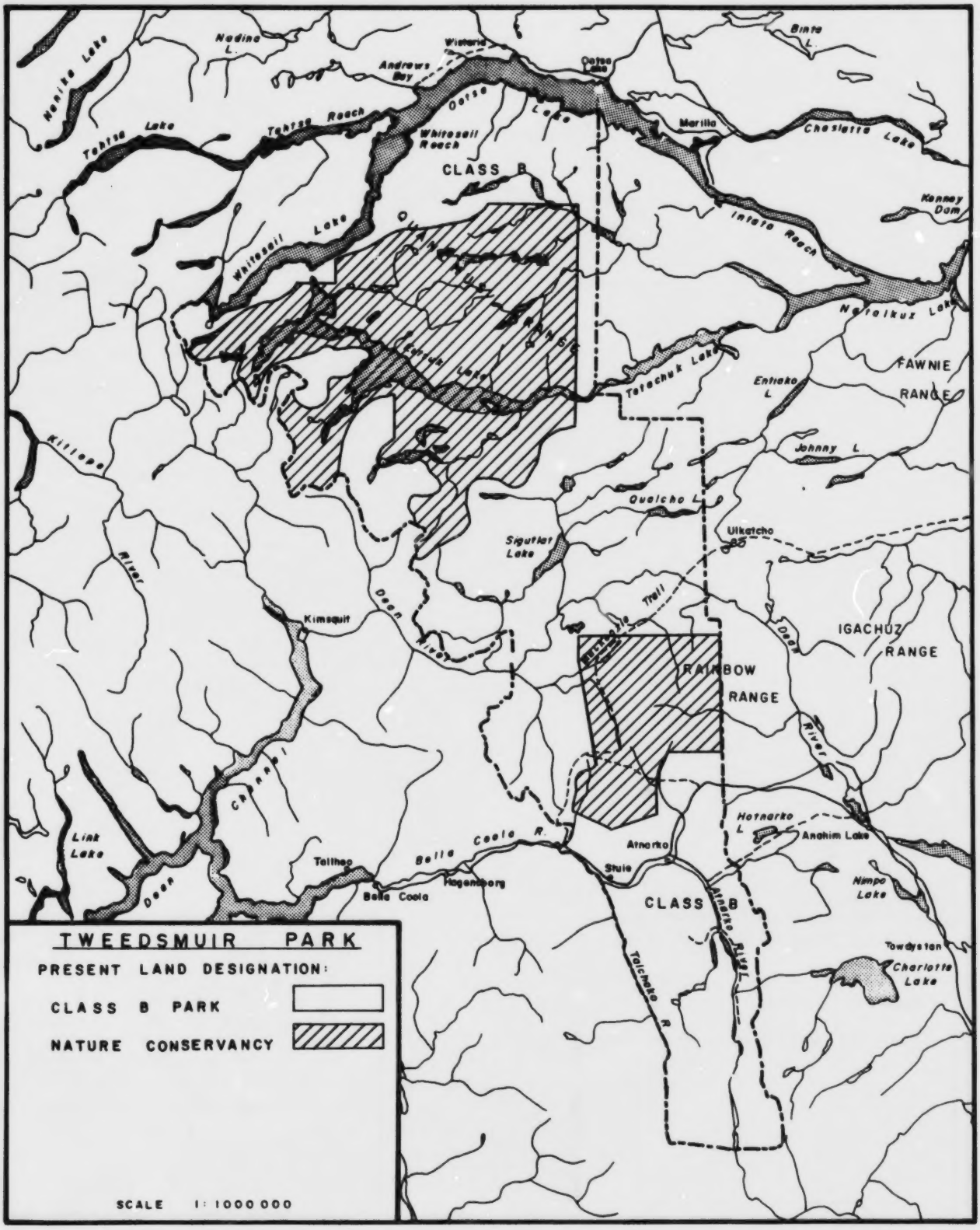

Nadina L
Wistaria
Andrews Bay
Ootsa Lake
Binta L
Tahtsa Reach
Whitesail Reach
Morrilla
Chesiatta Lake
Kenney Dam
Intata Reach
Whitesail Lake
QUANCHUS RANGE
Natalkuz L
Eutsuk Lake
Tetachuk Lake
Entiako L
FAWNIE RANGE
Johnny L
Kitlope River
Quaicho L
Ulkatcho
Sigutlat Lake
Kimsquit
Dean River
Wacheete Trail
IGACHUZ RANGE
RAINBOW RANGE
Dean River
Chanal
Hotnarko L
Anahim Lake
Link Lake
Tallheo
Bella Coola R
Atnarko
Stuie
Hagensborg
Bella Coola
Nimpo Lake
Talchako R
Tawdystan
Charlotte Lake
TWEEDSMUIR PARK
ORIGINAL PARK BOUNDARY (1938)
PRESENT BOUNDARY
SCALE 1: 1000 000

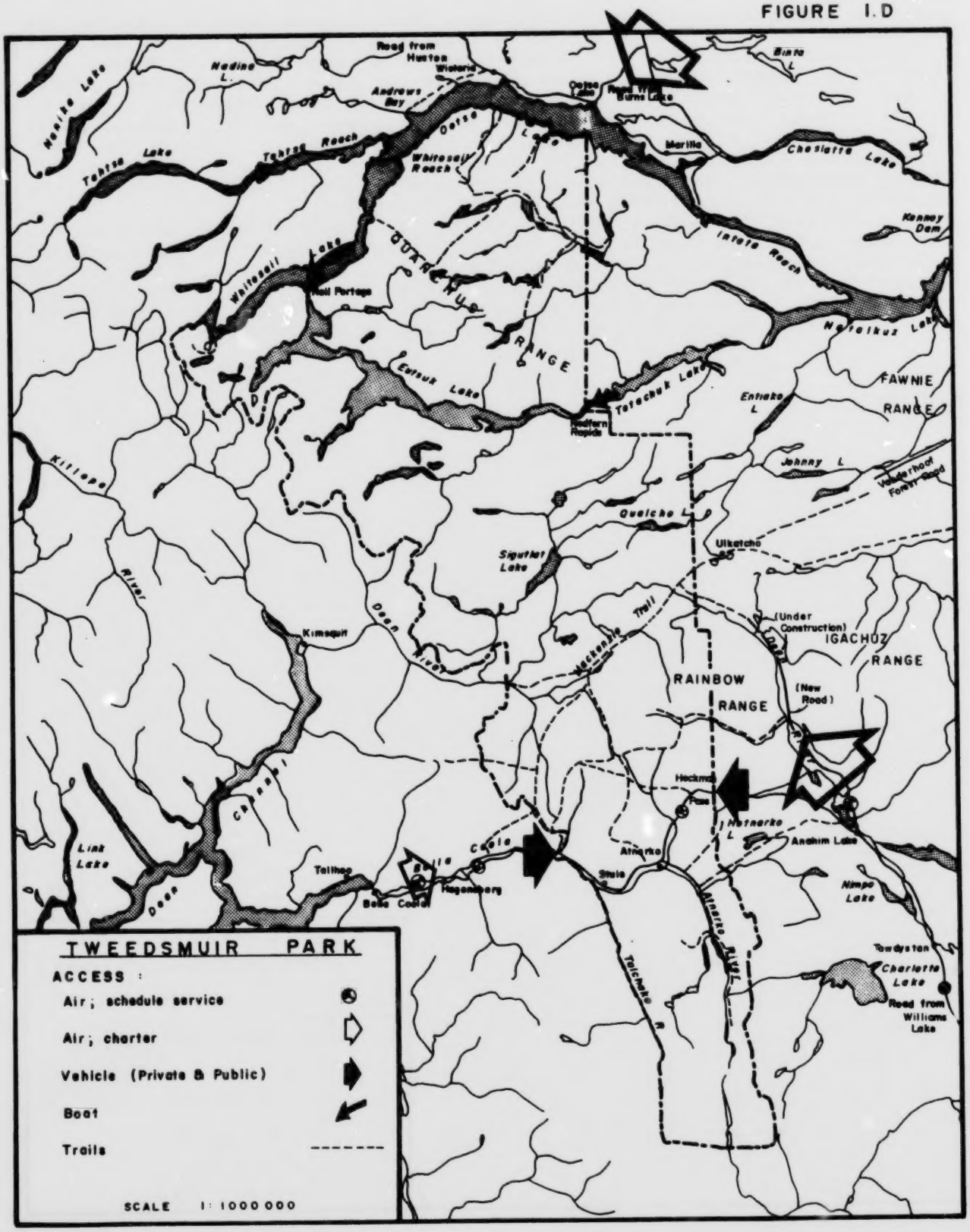
FIGURE I.C


Nadina L.
Andrews Bay
Victoria
Ootsa Lake
Binta L.
Tahtsa Lake
Tahtsa Reach
Whitesail Reach
Morrilla
Chesletta Lake
CLASS B
Kenney Dam
Whitesail Lake
Intata Reach
Natalkuz Lake
FAWNIE RANGE
Entsko L
Johnny L
Kitlope River
Sigutlat Lake
Ulkatcho
Kimsquit
Dean River
IGACHUZ RANGE
RAINBOW RANGE
Hotnarko L
Anahim Lake
Nimpo Lake
Atnarko
Stuie
Bella Coola R.
Hagensborg
Bella Coola
Lint Lake
Talchako R.
Towdystan
Charlotte Lake
TWEEDSMUIR PARK
PRESENT LAND DESIGNATION:
CLASS B PARK
NATURE CONSERVANCY
SCALE 1: 1000 000

operates along this route to Bella Coola. Bella Coola, some 40 kilometers to the west of the Park, is served by regularly scheduled airline services to Vancouver, Dean River (Kimsquit Camp) and Anahim Lake. There are, however, no scheduled sea ferries available for passengers. Direct access to the Park can be gained by charter helicopter from Bella Coola, or by float plane to the Park's lakes from nearby towns like Nimpo Lake, Burns Lake, Bella Coola and Vanderhoof. It is also possible to reach the Park by boat from Wistaria Landing, on the north shore of Ootsa Lake, travelling the 60 kilometers westward along Ootsa and Whitesail Lakes to cross the Chikamin Portage into Eutsuk Lake at St. Thomas Bay.

Historical development and the nearby existence of good farmland and anchorage has meant that Bella Coola and its valley have been the centre of population development in the area. Inevitably, development in the Park is centred on the Highway 20 route, which links Bella Coola to the outside world by land route, and along which many visitors travel. The locations of settlements, access and major features are shown in Figure 1.D.

FIGURE I.D


Road from Hunter
Victoria
Andrews Bay
Nadina L.
Nadina Lake
Tahtsa Lake
Tahtsa Reach
Whitesail Reach
Whitesail Lake
Poll Portage
Ootsa Lake
Ootsa L.
Morrice
Binta L.
Chesletta Lake
Kenney Dam
Intata Reach
Nechakuz Lake
OOMINECA RANGE
Entiako L.
FAWNIE RANGE
Johnny L.
Quaicho L.
Ulkatcho
Sigutlat Lake
Eutsuk Lake
Tatlatchuz Lake
Western Hospital
Kitlope River
Kimsquit
Dean River
Mackenzie Trail
(Under Construction)
IGACHUZ RANGE
RAINBOW RANGE
(New Road)
Hotnarko L.
Anahim Lake
Nimpo Lake
Atnarko
Stuie
Atnarko River
Tatlayoko
Bella Coola
Hagensborg
Link Lake
Dean
Talchako R.
Tsyoton
Charlotte Lake
Road from Williams Lake
TWEEDSMUIR PARK
ACCESS :
Air; schedule service
Air; charter
Vehicle (Private & Public)
Boat
Trails
SCALE 1: 1000 000

2.0 NATURAL RESOURCES

Tweedsmuir Park is richly endowed with natural resources, which are relatively unexploited because of the area's isolation and Park status. This section considers the Park's natural resources such as wildlife, fish, forests, flora and landscapes, and the controlling forces that determine the variety and locations of these resources; the climate and geological form and evolution.

2.1 CLIMATE

The Park's climate is a direct influence on its natural resources, especially in determining degrees of erosion & deposition, the nature of vegetation and animal habitat (fish & wildlife), and environmental conditions for animal development.

As a result of the Park's large size, and its location in the transition between the Coast Range Mountains and Interior Plateaus, there is a huge variation in climate, especially precipitation. In terms of overall climate, the Park is a transition area between climate classifications. Using the Koppen-Geiger-Pohl system (Strahler, 1983) the Park is transitional between the Midlatitude Marine West Coast Warm Summer (Cfb) climate to the west, Highlatitude Cold Boreal Snowy-forest Cool Summer (Dfc) climate to the north & east, and the Highland (H) climate in high-altitude areas throughout.

In general terms the Park can fall under the influence of either Continental Polar air masses from the north & east (dry air masses, cold in winter, warm in summer) or Pacific Maritime Polar air masses from the west (wet & mild all year) (Strahler, 1983). During the frequent west to east movement of cyclones & fronts from the Maritime Polar air masses, the mild moist air passes over many chains of mountains. The air is cooled as it lifts over the mountains, and much precipitation results, especially on the most westerly mountains which receive this air first. With each successive mountain range further east, there is less moisture remaining so that the east side is in the 'rainshadow' of the mountains and is much drier. Eastward-moving air is cooled as it passes over the mountain ranges. In winter it loses its warming effect as it moves east, so that the east side of the Park has cooler winters; it is, moreover, more often affected by the cold dry Polar Continental air, which adds to the much colder temperatures of winter & the dryness of these areas all year.

In summary then, the Park's distinctive climatic pattern is one of increasingly colder temperatures in winter, and increasing dryness, from west to east.

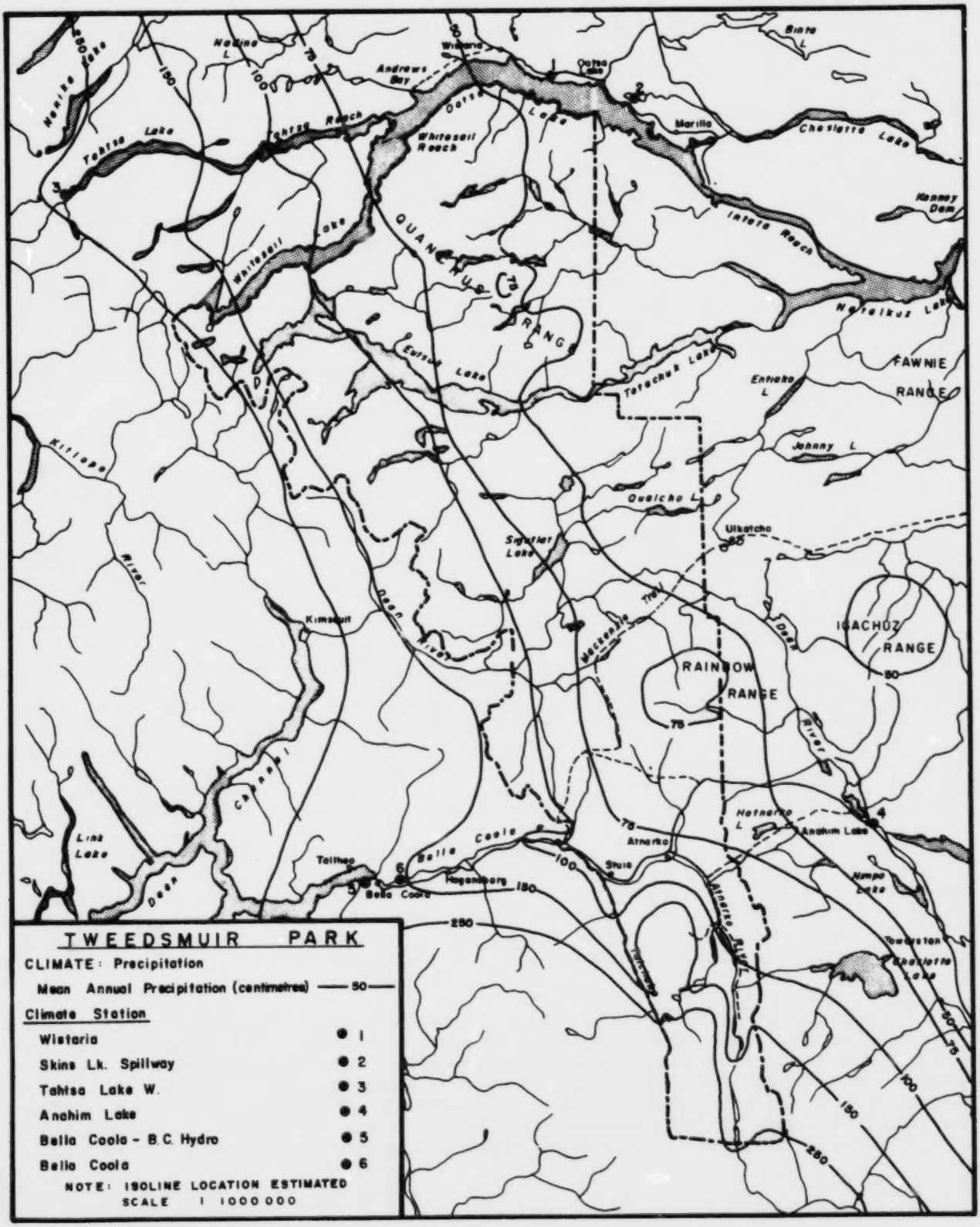
There are no climate stations in the Park, although one existed at Stuie many years ago. Consequently, the climate must be inferred from that observed at comparable locations elsewhere. Climate stations with reliable length of observations near the Park are shown on Figure 2.A.1.

In more specific terms, the Park precipitation, snowfall and temperatures will be described in the following sections.

2.1.1 Precipitation

As mentioned above, precipitation decreases eastwards in the Park, in response to the rainshadow effect. Apart from this, the high elevation areas tend to receive more precipitation than valleys or plateaus between them . Based on this situation, and data from nearby climate stations, Figure 2.A.1 has been drawn to show approximate annual precipitation. The rainfall isolines (lines joining places with equal amounts of rainfall) 'bend' around the mountains and valleys, demonstrating the effects of high

FIGURE 2.A.1


TWEEDSMUIR PARK
CLIMATE: Precipitation
Mean Annual Precipitation (centimetres) —— 50 ——
Climate Station
Wistaria ● 1
Skins Lk. Spillway ● 2
Tahtsa Lake W. ● 3
Anahim Lake ● 4
Bella Coola - B.C. Hydro ● 5
Bella Coola ● 6
NOTE: ISOLINE LOCATION ESTIMATED
SCALE 1 1000 000
QUANEW Ca RANGE
RAINBOW RANGE
IGACHUZ RANGE
FAWNIE RANGE
Whitesail Lake
Tahtsa Lake
Nechako River
Kimsquit
Bella Coola
Anahim Lake
Nimpo Lake
Charlotte Lake
Kenney Dam
Ulkatcho
Atnarko
Stuie
Hagensborg
Telhaq
Eutsuk Lake
Tatlatui Lake
Entiako L
Johnny L
Quaicho L
Hotnarko L
Dean River
Deer
Chilcotin
Link Lake
Morrison
Owen Lake
Whitesail Reach
Andrews Bay
Morrison Lake
Nadina L
Binta L
Owen Lake
Intata Reach
Natalkuz Lake
Tatlatui
Tatlatui River
Owen Lake
Smithers
Burns Lake
Houston
Francois Lake
Fraser Lake
Vanderhoof
Prince George
Quesnel
Williams Lake
Alexandria
Chilcotin River
Dean River

and low altitude. Total annual precipitation (in centimeters) at the nearby climate stations is: Wistaria (#1) - 44; Ootsa Lake (#2) - 44; Tahtsa Lake West (#3) - 200; Anahim Lake (#4) - 32 (approximation); Bella Coola B.C. Hydro (#5) - 211; Bella Coola (#6) - 161 (Environment Canada, 1981). Precipitation is much heavier in winter in the west, while towards the east it is more evenly distributed, with Spring the driest season. The Atnarko Valley, where most visitors travel, receives around 90 centimeters of precipitation: much less than the Bella Coola Valley and Coast Range Mountains, but considerably more than Plateau areas to the east and northeast where totals are under 50 centimeters in the Park's northeast margins.

2.1.2 Snowfall

The amount of precipitation in the form of snow, and in particular the depth of snow accumulation, is of particular relevance to the survival rates, habitat and migrations of the Park's largest wildlife species such as woodland caribou and moose. The climate stations near the Park measure snowfall, but not accumulation, while there are active snow courses (snowfall accumulation measurement areas) in the Park at Mount Wells (elevation 1490 meters), north of the Park at Skins Lake (elevation 880 meters), east of the Park at Nazko (elevation 1070 meters) and northwest of the Park near Tahtsa Lake (elevation 1300 meters). These are shown on Figure 2.A.2. Additional snow depth data, for early 1986 only, in the Entiako area is available in Cichowski, 1986, and for the early 1950's from discontinued snow courses at Pondosy Lake and the Chikamin Range.

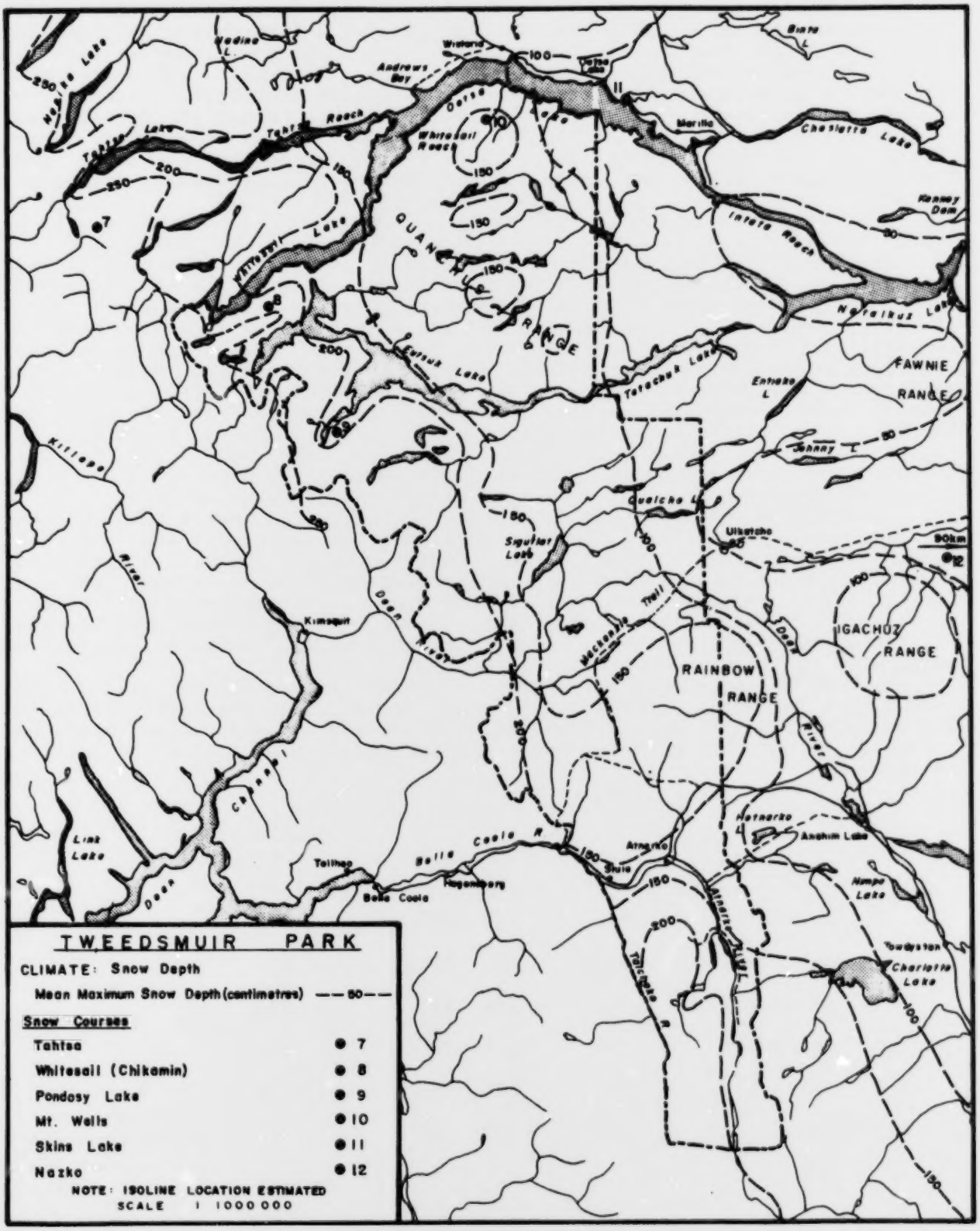
Snowfall amount is sensitive to temperature, which means that higher altitude areas receive not only more total precipitation, but also a larger proportion as snow. Thus, Bella Coola receives only 12% of its precipitation as snow, while surrounding mountains would receive perhaps 50% of their greater precipitation as snow. In response to colder temperatures, stations like Ootsa Lake, Tahtsa Lake and Anahim Lake receive most of winter precipitation as snow, with over half of total precipitation as snow at the latter two stations.

Snow depth accumulation is the critical factor for wildlife. In common with rainfall patterns, snow depth accumulation decreases markedly eastwards across the Park and beyond. Using the 6 snow course stations across & beyond the northern part of the Park, the following pattern emerges:

Snow Courses:

Fig. 2.A.2 #	Name	Elevation (meters)	Longitude (West)	Mean Max. Snow Depth (cm.)
7	Tahtsa L.	1300	127 38'	299
8	Whitesail L.	1330	127 05'	231
9	Pondosy L.	1020	126 53'	163
10	Mt. Wells	1490	126 25'	157
11	Skins L.	880	125 59'	56
12	Nazko	1070	123 39'	29

FIGURE 2.A.2


TWEEDSMUIR PARK
CLIMATE: Snow Depth
Mean Maximum Snow Depth (centimetres) --50--
Snow Courses
Tahtsa ● 7
Whitesail (Chikamin) ● 8
Pondosy Lake ● 9
Mt. Wells ● 10
Skins Lake ● 11
Nazko ● 12
NOTE: ISOLINE LOCATION ESTIMATED
SCALE 1 1000 000
QUANCHUS RANGE
FAWNIE RANGE
IGACHUZ RANGE
RAINBOW RANGE
Whitesail Reach
Tahtsa Reach
Tahtsa Lake
Eutsuk Lake
Tatuchas Lake
Natalkuz Lake
Chelaslie Lake
Kenney Dam
Entiako L.
Johnny L.
Quaicho L.
Ulkatcho
Sigutlar Lake
Kimsquit
Dean River
Kitlope River
Clisdaspi
Lint Lake
Tolhaa
Bella Coola
Bella Coola R.
Atnarko
Anahim Lake
Nimpo Lake
Charlotte Lake
Talchako R.
Nazko
Quesnel R.
Blackwater R.
Euchiniko R.
Mackenzie Trail

Snow depth diminishes rapidly east of the Coast Range Divide, declining from around 300 cm. to only 1/10 th of that at Nazko, some 150 kilometers east of the Park and 270 kilometers east of Tahtsa Lake snow course. The table above demonstrates the influence of altitude as well. Mt. Wells, at 600 meters above the nearby Ootsa Lake shoreline accumulates probably 50% more snow than the nearby lakeshore. Skins Lake snow course, only 30 kilometers further east of Mt. Wells, but 610 meters lower, accumulates about a third as much snow. On the basis of the above figures, approximate mean maximum snow depth isolines have been drawn in on Figure 2.A.2, for areas in and north and east of the Park only. Although no data exists for the Atnarko Valley snow depth, it is assumed that lower elevations, penetration of mild Pacific air and "snow shadow" from nearby mountains decreases the snow depth in the valley itself.

2.1.3 Temperature

Air Temperatures experienced in the Park are much influenced by the effects of eastward-moving Pacific air and by elevation: The Pacific air has a warming effect in winter & slightly cooling effect in summer, while increased elevation always decreases temperatures. Thus, Bella Coola at sea level (Figure 2.A #6) experiences mean daily temperatures of -2.8 degrees C. in January and 16.5 degrees C. in July, while Tahtsa Lake at 863 meters (Figure 2.A #3) shows the influence of higher elevation and shelter from Pacific air with cooler temperatures of -9.1 degrees C. and 11.3 degrees C. Further east, Skins Lake at a similar elevation to Tahtsa (Figure 2.A #2) has colder winter and warmer summer temperature means of -10.6 degrees C. and 13.8 degrees C., reflecting greater distance from Pacific air and more influence of Polar Continental air masses (winter cold, summer warmth). A similar pattern is experienced throughout the Park. Daily maximum mid-summer temperatures are around 22 degrees C. in the Bella Coola - Atnarko Valley, 20 degrees C. in Plateau areas of the east Park, and 17 degrees C. in lower parts of the western mountain areas. Daily minimum mid-winter temperatures are around -6 degrees C., -15 degrees C. and -13 degrees C. for the same areas. Much colder temperatures are experienced at higher elevations, and there is considerable variability as locations fall alternately under the influence of Maritime and then Continental air masses. Frost-free period is under 60 days for most of the Park, and under 100 days in the milder Bella Coola - Atnarko Valley and northeast corners of the Park.

2.1.4 Climate Suitability

Climate can be regarded in terms of how suitable it is for general living, active and passive recreation, or other occupations. Bennett (1977) has devised various means of interpreting climatic data into a more meaningful sense than mere statistics. He has defined 'summer' and 'high summer', 'winter' and 'deep winter' and calculated the duration of these subjective seasons at climate stations. Results are as follows:

Duration of ... (in days)	'high summer'	'summer'	'high winter'	'winter'
Bella Coola	167	118	121	52
Stuie	203	126	131	37
Tahtsa Lake W.	115	0	193	144
Skins Lake	139	46	177	177

These figures give a clear indication in particular of the long duration of winter in the east of the Park, and the long duration of high summer in the Bella Coola - Atnarko Valley; facts of significance to visitors and tourist commercial interests. 'Suitability for recreation' figures are equally revealing. With class 1 rating as the most suitable in the province, and class 5 rating for the least suitable, suitability for passive-summer (sightseeing, sunbathing, etc.) and active-winter (skiing) recreation activities has been calculated. Bella Coola rates as 1 in summer and 3 (too warm) in winter for temperature, but only 3 in summer and 4 in winter for precipitation, because of the large number of rain days. Skins Lake (Ootsa), on the other hand, rates a 2 at all seasons with a 'too cold' limitation in summer and 'too warm' in winter. These ratings would be similar in most adjoining parts of the Park, except for high elevations.

2.2 PHYSIOGRAPHY

The Park's physiography can be described in terms of its geography, as in the physiographic subdivisions of the Park, and in terms of regional landscapes and natural regions with common physical characteristics. These are described in the following sections.

2.2.1 Geography

Tweedsmuir Park contains areas of the two largest of the 4 main physiographic subdivisions of B.C. (after Holland, 1976); namely, the Western System and the Central System. With no sharp differential between the two, transitional areas with modified features of both subdivisions are found within the Park, along with typical areas. Figure 2.B shows the basic division of the Park into the West and East systems, roughly following the 1600 meter contour. The geological origins and physiographic characteristics of these Systems are described below.

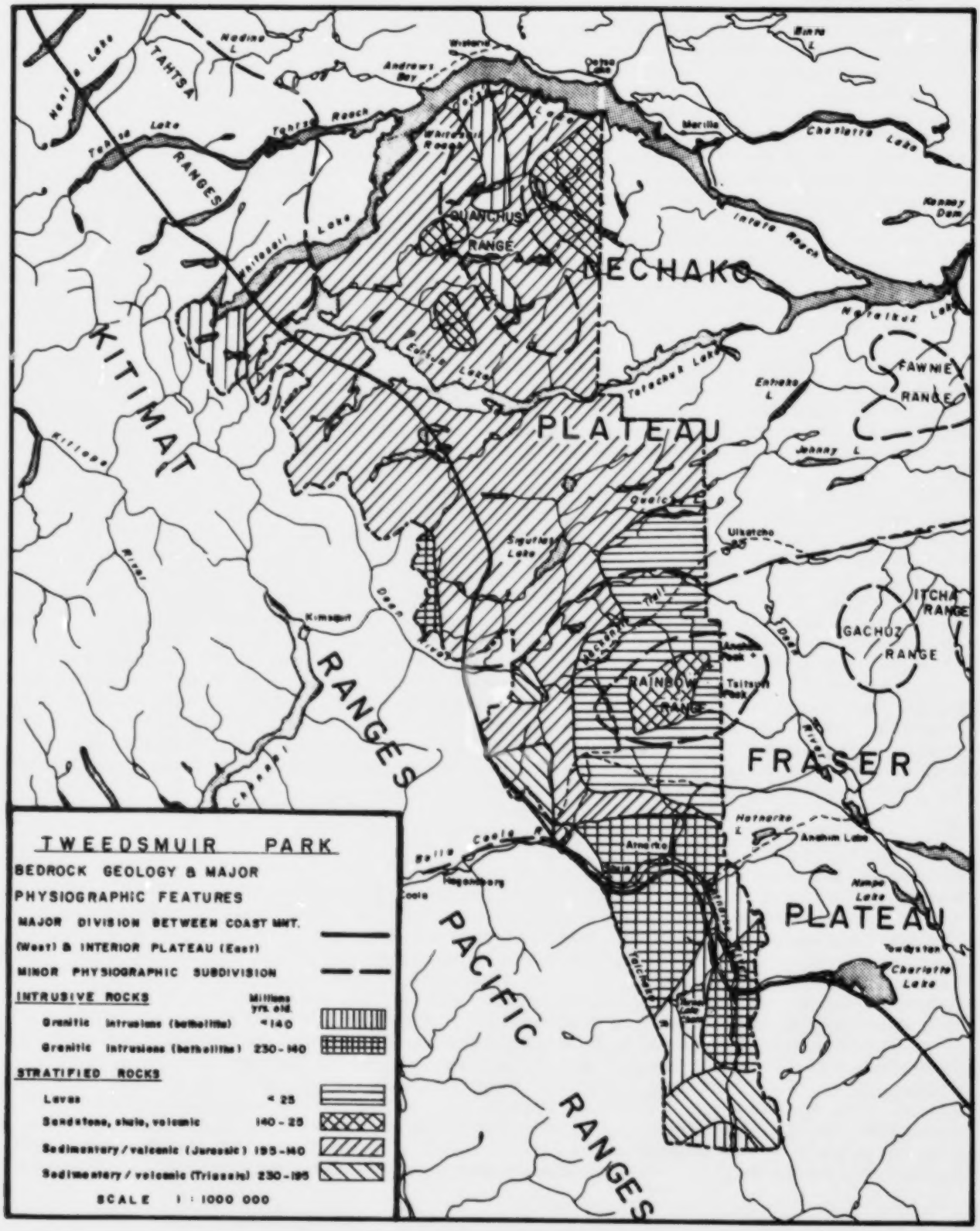
2.2.1.1 The Western System (Coast Mountains)

The entire Western System comprises the Outer Mountain Area (offshore islands), the Coastal Trough (inside Passage and Coast Lowlands) and the Coast Mountains Area of B.C. The western margins of Tweedsmuir Park are included in the latter area.

The Coast Mountains area traces its important geological origins to the intrusions of magma into underlying rock bodies during the Cretaceous Period (63 - 135 million years ago) to form massive batholiths of granitic and other metamorphosed rock at depth under almost the entire area. During the subsequent Tertiary Period, erosion was deep enough to remove many of the overlying mountains of Jurassic and older sedimentary and volcanic rocks, so that many of the granitic batholiths were exposed. Other mountain ranges in the area still retain the older rock surfaces, but may well have granite cores. Figure 2.B indicates the exposure areas of granite, and the older rock remnants.

Continued Tertiary Period erosion reduced the area to generally low relief. During this time, drainage patterns were influenced by granite bedrock structure, so that a trellis-like pattern developed parallel to joints or faults, which divided the area into blocks. Eventually, during the Pliocene Period (1 - 13 million years ago) the collisions of the American and Pacific Plates, and associated subduction activity, uplifted these areas, and produce volcanic cone activity further south. The uplift, which was strongest along the present day crests of the Coast Range and less so elsewhere, rejuvenated the erosive power of streams which incised themselves into the landscape sufficiently to remove most of the flatter Tertiary surface and produce a mountainous topography of mature relief by

FIGURE 2.B


TWEEDSMUIR PARK
BEDROCK GEOLOGY & MAJOR PHYSIOGRAPHIC FEATURES
MAJOR DIVISION BETWEEN COAST MNT. (West) & INTERIOR PLATEAU (East)
MINOR PHYSIOGRAPHIC SUBDIVISION
INTRUSIVE ROCKS
Millions yrs. old
Granitic intrusions (batholiths) < 140
Granitic intrusions (batholiths) 230 - 140
STRATIFIED ROCKS
Lavas < 25
Sandstone, shale, volcanic 140 - 25
Sedimentary / volcanic (Jurassic) 195 - 140
Sedimentary / volcanic (Triassic) 230 - 195
SCALE 1 : 1000 000
TAHTSA RANGES
QUANTCHUS RANGE
NECHAKO PLATEAU
KITIMAT RANGES
FAWNIE RANGE
ITCHA RANGE
GACHUZ RANGE
RAINBOW RANGE
FRASER PLATEAU
PACIFIC RANGES
Nadina L.
Tahtsa Lake
Whitesail Lake
Ootsa Lake
Morrison Lake
Charlotte Lake
Kenney Dam
Intata Reach
Natalkuz Lake
Eutsuk Lake
Tetachuck Lake
Eahoko L.
Johnny L.
Quaich
Ulkatcho
Snaffle Lake
Kimsquit
Dean River
Taseko River
Anahim Lake
Hotnarko L.
Nimpo Lake
Chilko Lake
Tatlayoko Lake
Bella Coola
Hagensborg

the end of the Pliocene Period; streams retained their drainage patterns by increased vertical erosion as uplift took place.

Beginning in the late Pliocene (3 million years ago) and mainly during the Pleistocene Period (1 million - 10,000 years ago), the System was subjected to intense glaciation; the so-called Pleistocene Ice Age. Ice accumulation was such that various valley glaciers eventually coalesced into an ice sheet of some 2500 meters thickness, moving generally northeast or southwest from the Coast Range crestline. Recession of the ice since then has been such that only a few remnant ice fields remain, in the original source areas e.g. the Monarch Icefield in the southwest corner of the Park, and there are a number of truncated valley glaciers. The effects of the Ice Age have been substantial. The highest peaks survived intact above the ice sheet and were sharpened to form horns and aretes (monadnocks). Lower mountains were completely overridden and their peaks rounded off. Later valley glaciers overdeepened valleys to create U-shaped cross-section shapes and the typically East-West-oriented lakes and valleys such as Eutsuk Lake in the north, and Turner Lake Chain in the south of the Park. Glacial deposition material (till or drift) was blanketed over the whole area, especially in the valley bottoms, where glacial erosion & deposition features such as drumlins, kames and eskers, moraines and moraine lakes are in abundance. Mountain slopes were subjected to cirque and valley-glacier erosion in the later stages of the Ice Age, especially on north-facing slopes which were steepened considerably. The eventual melting of the massive thickness of the ice sheet led to the rise (isostatic adjustment) of land surfaces, which had been considerably depressed by the weight of ice; this Holocene (Recent) Period event has enabled streams and rivers to cut or incise their channels up to 100 meters further into the landscape as erosive power temporarily increased.

The Coast Mountains area in Tweedsmuir Park is, then, a result of its geological structure & history: original volcanoes and sedimentary rocks were replaced in most areas by granite batholiths, which have been uplifted and eroded, and then subjected to extensive glaciation in Recent time. The area can be characterized as one of high mountains and glaciated valleys, but landscape appearances vary somewhat within the area in response to variables such as climate, the resistance and jointing structure of bedrock, and especially the degree of Pliocene uplift and Holocene rise. These variations are categorized in detail as Regional Landscapes in Section 2.2.2, while photographs of representative landscapes are included in Section 4.

2.2.1.2 The Interior System (Interior Plateau)

The Interior System, the interior of B.C. between the Coast Mountains area and the Rocky Mountains, is a diverse area of low-lying plains and basins, plateaus in various stages of dissection, highlands and mountains, but all with common geology and physiographical development. The System can be conveniently split into North, Central and South Plateau and Mountain Areas for descriptive purposes (Holland, 1976). Included in Tweedsmuir Park are parts of the Nechako and Fraser Plateau sections of the South Plateau and Mountain Area, and a small part of the Central Plateau and Mountain Area in the extreme North of the Park. (see Figure 2.B).

There are close parallels between the physiographical histories of the Interior and of the Coast Range, although geologically they are quite different. The Tertiary Period erosion that exposed the Coast Range batholiths reduced the Interior System to a 500 - 700 meter-high plain of moderate relief by the late Tertiary; this levelling-out process was supplemented by the accumulation of extensive lava flows on the Nechako and Fraser Plateaus during the Miocene and early Pliocene Periods (25 - 10

million years ago). These flows originated from olivine basalt outpourings from fissures and from basaltic lava from several shield volcanoes. This volcanism is not connected with the intrusions into the Coast Range or with the subduction-induced volcano activity near the coast further south, but represents the activity of 'hot-spot' shield volcanoes outpouring large amounts of free-flowing basaltic lava which spreads out over a wide area. Figure 2.B indicates the extent of the basaltic lava flows, and shows the location of the Rainbow Range, the remnants of one of the three major shield volcanoes. The Rainbow Range's summit of over 2500 meters at Tsitsutl Peak stands out some 1500 meters above the surrounding Plateau, while the volcano is about 25 kilometers in diameter; Anahim Peak is the obsidian core (plug) of a subsidiary cone on its northeast flank. Extensive dissection of the Rainbow Range took place in the late Tertiary and continues, so that it is now at the advanced erosion stage (Strahler, 1983), almost separated into isolated blocks.

The Pliocene uplift that elevated the Coast Range occurred at varying rates to the Interior System, so that the most strongly uplifted areas were subjected to dissection by their rejuvenated streams, especially if these areas had already been somewhat incised in the Tertiary Period prior to uplift. Thus areas such as the Quanchus Range (see Figure 2.B) were greatly uplifted and intensively dissected so that little remains of the originally uplifted Tertiary plateau except the monadnock (erosion-resistant) peaks of the Range, separated by extensive and more recent rolling areas. Transitional areas close to the Coast Range area were uplifted more strongly and quickly than plateaus further east; thus the extreme westerly areas of the Nechako and Fraser Plateaus found in Tweedsmuir Park (see Area G31 in Section 2.2.2) are more heavily dissected and therefore more irregular than the flatter areas to the east which were uplifted less. Extensive flatter Tertiary plain areas remain little dissected, as in the Plateau area of the Park south of Eutsuk Lake and north of the Rainbow Range.

The Pleistocene Ice Age had substantial effect on the Interior System, much as it did at the same time on the Coast Range. The area was completely covered by the advancing ice sheet over 2500 meters high moving generally eastwards from the Coast Range. Relief features were rounded off, depressions and valleys were deepened to become lakes, and glacial till was deposited over the entire plateau. Drumlins of glacial till were deposited in swarms under the ice over extensive areas by a plastering action in which layer upon layer of boulder clay is spread upon the drumlin core (Strahler, 1983). These lozenge-shaped hills have an axis parallel to the direction of ice movement, and are represented in the Park north of the Dean River, for example. With the melting of the ice sheets in Recent times, meltwater channels were cut by temporary streams, kames and eskers emerged, lakes filled depressions of all kinds, and small streams wandered from hollow to hollow in a deranged pattern.

In the Holocene (Recent) Period, rising of the land surface has produced another round of incision of stream and river courses, especially close to the Coast Range. The differential uplift of the Pliocene Period and rising in the Holocene Period has produced a variety of landscapes in the otherwise homogenous area, while the volcanic origin and structure of the Rainbow Range has produced a different landscape again. These variable landscapes are described in detail in the following section.

2.2.2 Landscapes

In order to help achieve the "Representative Landscapes Goal" of the Provincial Parks System, the province has been divided into a system of geographical units each having relatively homogenous patterns of biotic,

physiographical and hydrological characteristics (Ministry of Lands, Parks & Housing, Oct. 1982). These unit divisions, based upon Holland's 4 physiographic divisions of B.C. (Holland, 1976), focus upon 16 Natural Regions containing common, adjoining landform types. While the smaller Natural Regions are environmentally very uniform, the larger ones are more diverse and have been subdivided. Thus a total of 52 Regional Landscapes, which are environmentally homogenous sub-units of the Natural Regions in terms of general patterns of landforms, hydrology and biota have been identified: these include 7 Special Regional Landscapes, which are important geographical components of the broader Regional Landscapes in which they occur.

Figure 2.C shows the Regional Landscapes of Tweedsmuir Park. They are based on subdivision of Physiographical Divisions and Natural Regions as listed below:

Physiographical Division:	#1. Western Mountains
Natural Region:	A. Coast Mountains
Regional Landscapes:	A1. Rugged Pacific Ranges
	A2. Kitimat Ranges
	A6. Western Chilcotin Transition Belt
Physiographical Division:	#2. Interior Plateaus & Mountains
Natural Region:	F. Hazelton - Skeena Mountains
Regional Landscape:	F26. Bulkley - Morice Rolling Mountains
Natural Region:	G. Interior Plateaus & Valleys
Regional Landscapes:	G30. Nechako Plateau
	G31. Western Fraser Plateau
	G35. Western Interior Shield Volcanoes (Special)

These Natural Regions and Regional Landscapes are discussed in sequence in the following sections. (Biogeoclimatic aspects of Landscapes are identified in Section 2.3.1).

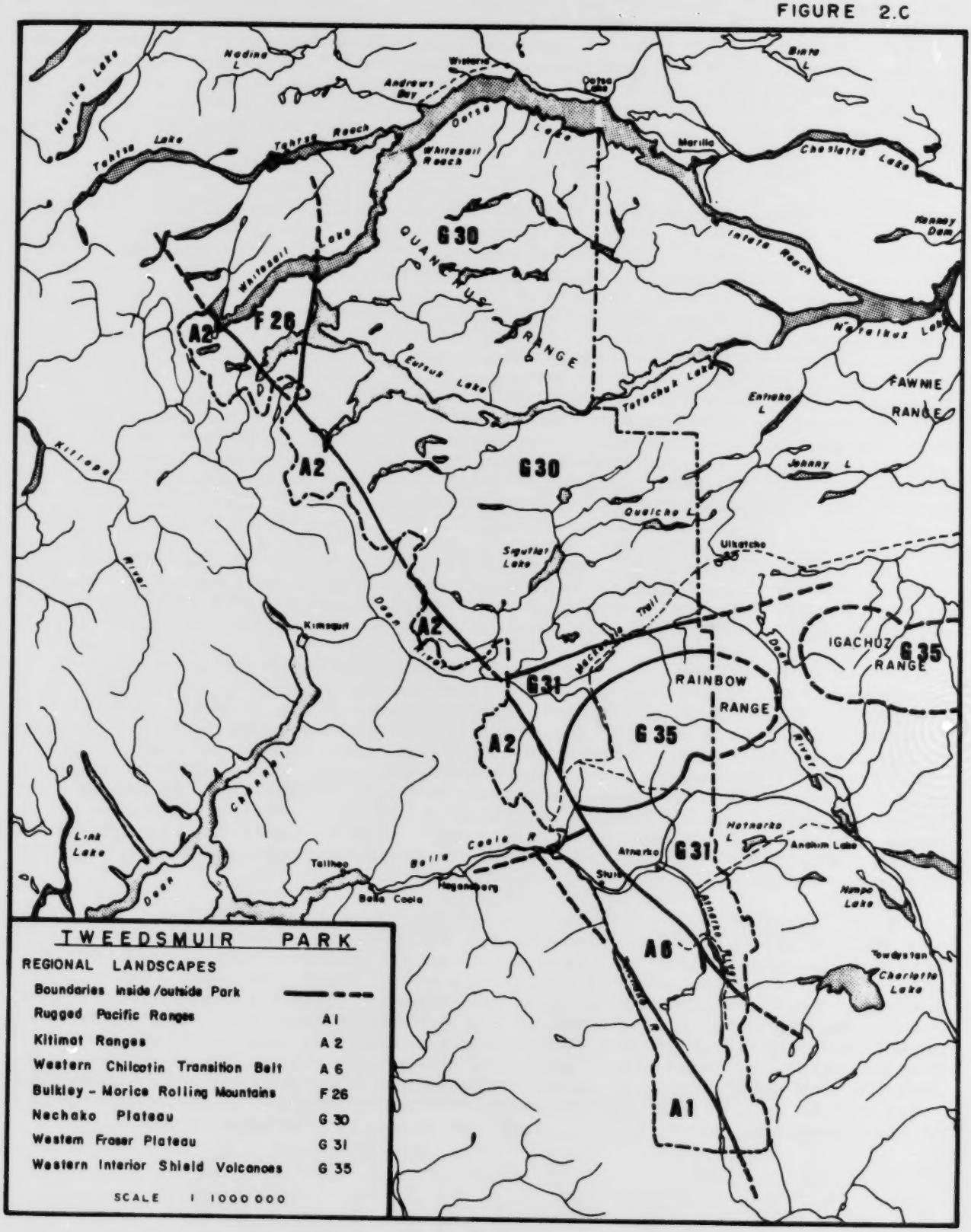
2.2.2.1 Coast Mountains Natural Region (Area A)

This region encompasses the mountainous western portion of the B.C. mainland. Climate increases in dryness eastwards and coolness northwards. Geologically, the region comprises the Coast Batholith and is a continuous range of rugged mountains heavily glaciated and dissected by numerous river valleys.

RUGGED PACIFIC RANGES REGIONAL LANDSCAPE (Area A1): This area comprises the main ranges of the Mainland coast mountains from Howe Sound to the Bella Coola River, and is the 'classic' landscape of the Coast Mountains. Jagged, ice-blanketed peaks over 3000 meters of generally granitic origin are separated by deep and steep-sided glaciated U-shaped valleys and fiords. As Figure 2.C indicated, only the southwest corner of the Park falls into this Regional Landscape area. This small area is, however, representative of the landscape; the ice fields, glaciers and glacial erosion features of Monarch Mountain, Concubine Peaks and Migma Mountain, the Talchako Glacier and U-shaped troughs such as Talchako Valley and Success Creek are fine examples of the Rugged Pacific Ranges.

KITIMAT RANGES REGIONAL LANDSCAPE (Area A2): This area is the northwards continuation of the previous landscape area, to the Alaska border, and is characterized by a more subdued relief, with peaks below 2300 meters, rocky but round-topped peaks, smaller glaciers and ice fields, and granitic domes

FIGURE 2.C


Nadina L
Andrews Bay
Whitesail Reach
Tahtsa Lake
Tahtsa Reach
Ootsa Lake
Morrill
Chesletta Lake
Kenney Dam
Intata Reach
Whitesail Lake
QUANCHUS RANGE
G 30
F 26
A2
Eutsuk Lake
Tatuchuz Lake
Entsako L
FAWNIE RANGE
Killbuck
Johnny L
Quaicho L
Sagutlar Lake
Ulkatcho
Kimsquit
Dean River
Trail
IGACHUZ RANGE
G 35
G 31
RAINBOW RANGE
Dean River
Chilko I
Lint Lake
Tatlayoko
Bella Coola R
Hotnarko L
Anahim Lake
Nimpo Lake
Stuie
Bella Coola
Hagensborg
Atnarko
A6
A1
Chilcotin River
Taseko Lakes
Charlotte Lake
TWEEDSMUIR PARK
REGIONAL LANDSCAPES
Boundaries inside/outside Park
Rugged Pacific Ranges A1
Kitimat Ranges A2
Western Chilcotin Transition Belt A6
Bulkley - Morice Rolling Mountains F26
Nechako Plateau G30
Western Fraser Plateau G31
Western Interior Shield Volcanoes G35
SCALE 1 1000 000

and rock faces. The extreme northwest fringe of Tweedsmuir Park is included in this landscape (see Figure 2.C) Here, relatively rounded peaks like Mt. Musclow (2100 meters) and Mt. Irma (2159 meters), with small ice fields, epitomize this landscape. Valleys such as those occupied by Whitesail and Eutsuk Lakes are wider and less steep-sided, and peak to valley floor relief range is only about 1200 meters rather than the 2500 meter range in area A1. Further south in this area, a similar landscape is found, for example, in the Pondosy Lake / Mountain, Tsaydaychuz Peak and Thunder Mtn. areas.

WESTERN CHILCOTIN TRANSITION BELT REGIONAL LANDSCAPE (Area A6): This belt exemplifies the topographic and climatic transition from Western Coast Mountains to dry Central Interior Plateau. It typically comprises high elevation parallel ridges separated by broad valleys with north-south aligned lakes. There is little permanent ice, and there is a complex geology of volcanic and sedimentary folds and granite intrusions. The most northerly section of this belt occurs in Tweedsmuir Park, extending north to the Bella Coola River (Figure 2.C), but is not characteristic of the landscape. Although relief is lower than the Pacific Ranges, substantial icefields occur on peaks such as Glacier Mountain and Panorama Ridge, while the major valley, the Atnarko, has been incised into the landscape and is more steep-sided and narrow than normal, while tributaries to it are hanging valleys. The Mt. Marvin / Hunlen Creek / Turner Lake area is more typical of this Regional Landscape area, however, with wider valley form and north-south alignment of valley and lake.

2.2.2.2 Hazelton-Skeena Mountains Natural Region (Area F)

This mountainous region lies inland of the Coast Mountains in north central B.C. north of 53.5 degrees North latitude. The transitional nature of the region between plateaus and other mountains means that climate, physical, hydrological and biotic characteristics are very variable.

BULKLEY-MORICE ROLLING MOUNTAINS REGIONAL LANDSCAPE (Area F26): This landscape is transitional between more rugged mountains to the west, and the Nechako Plateau to the east. There is significant relief, much of it rolling in form between 1500 and 2000 meters and bisected by major lakes. In Tweedsmuir Park the southwesternmost tip of this regional landscape is represented by a small area in the northwest corner; the Chikamin Range - Eutsuk Lake (West Arm) area (see Figure 2.C), which is similar to the Tahtsa Ranges further north. Although physically similar to the other areas of the regional landscape, the area's size is restricted by the lakes to the north and south and likely represents the warmest and wettest parts of the Landscape.

2.2.2.3 Interior Plateaus & Valleys Natural Region (Area G)

This rolling to flat region, which occupies the central portion of the province, is interrupted by several areas of higher, more rugged relief, and is dissected by several major glaciated river valleys. The region developed from continental glaciation over lava plains, with consequent widespread deposits of glacial till, deranged drainage patterns, and monadnocks. Climate is cool in summer and cold in winter, with variable precipitation, and there are numerous lakes and swampy areas. This vast area has few abrupt environmental changes, and thus the Regional Landscape areas within it can only be defined in terms of the environmental variety of the landscape rather than by distinct physical characteristics.

NECHAKO PLATEAU REGIONAL LANDSCAPE (Area G30): This hilly or gently-rolling forested area of low relief between 1300 and 1700 meters is characterized by glacial erosion and depositional features, erosion-resistant monadnocks rising above the plateau, and numerous lakes of all sizes connected by deranged drainage. As Figure 2.C indicates, most of Tweedsmuir Park north of the Dean River is included in this Regional Landscape and presents an excellent representation of characteristic features. Topography here is gently rolling with deranged drainage and swamps, while the numerous moraine-dammed and gouged (over-deepened) lakes of various sizes indicate the direction of movement of glacial ice by their southwest or west to northeast or east elongation. The Quanchus Range (Mt. Wells, Wells Gray Peak, etc.) are a characteristic series of erosion-resistant monadnocks rising some 1000 meters above the rolling terrain, between Ootsa and Eutsuk Lakes.

WESTERN FRASER PLATEAU REGIONAL LANDSCAPE (Area G31): Occurring south of area G30, this landscape is distinct from it by a flatter topography, smaller lake sizes and lack of dissection except by major rivers. Three shield volcanoes rise prominently above the plateau (see Area G35 below). Only small areas of this landscape exist within Tweedsmuir Park, chiefly around the Takia and Atnarko Rivers (Figure 2.C). These small areas are transitional between the flat plateau beyond the Park boundary and mountains further west, and are thus more rolling than the plateau proper, and have suffered more dissection. Moreover, the area is interrupted by the Central Interior Shield Volcanoes and is thus not representative of the regional landscape area.

CENTRAL INTERIOR SHIELD VOLCANOES (SPECIAL LANDSCAPE) (Area G35): There are 3 shield volcanoes in an east-west line across the northwest of the Fraser Plateau. The peaks of 2300 - 2500 meters stand prominently above the surrounding plateau and are heavily glaciated and dissected by U-shaped valleys. Slopes are characterized by coloured rock bluffs and talus (scree) slopes, and there is a radial drainage pattern. The most westerly of these volcanoes, the Rainbow Range, lies within the Park, except for the most easterly slopes, and exhibits the classic aspects of the regional landscape; radial drainage, very heavy dissection by Beef Trail Creek, Mackenzie Valley, etc., and steep peaks sharpened by dissection (for example Tsitsutl Peak and Mt. Mackenzie). Headward erosion into the volcano flanks has virtually separated the volcano into 3 or 4 peaks.

2.3 Biology

With such a varied climate, physiography and landscapes, it is no surprise that the biology of the Park reveals the pattern of a rich resource showing great variety. In the following sections, the great diversity of flora and fauna (wildlife & fish) are described in some detail, and the status of forests is discussed in terms of infestations and fire ecology.

2.3.1 Flora: Biogeoclimatic Zones

Various approaches can be taken to the description of the flora of an area such as Tweedsmuir Provincial Park. Since a system of biogeoclimatic zones has been developed by the B.C. Ministry of Forests (B.C. Forest Service), it is appropriate to use this since it is up-to-date and intended for research, management and planning purposes.

2.3.1.1 The Biogeoclimatic Unit Classification System

The British Columbia Ministry of Forests is developing an ecosystem-based classification of the forest and range land of the province, which has evolved from the biogeoclimatic system developed over the last thirty years by Dr. V. J. Krajina and his students at the University of British Columbia. The system considers and integrates primarily climate, soil and vegetation data, thereby providing a framework for forest and range management, planning and research.

For a detailed discussion of the principles and philosophy of the biogeoclimatic ecosystem classification system, refer to Pojar, Klinka and Meidinger (1985). The Ministry of Forests system is a multi-level hierarchy with three levels of integration - the vegetation level, the climatic (biogeoclimatic) level, and the site (ecosystem) level.

The climatic (biogeoclimatic) level allows the subdivision of the province into broad geographic areas characterized by zonal or climatic climax plant associations that occur on average or mesic sites, geographic areas in which a predictable mosaic of ecosystems occurs on the range of sites present in that area. The classification of biogeoclimatic units is based primarily on climatic relationships. Zones, subzones and variants are identified, using different vegetation criteria as they reflect various degrees of climatic influence. The biogeoclimatic unit symbols are composed of three parts: for example, the symbol CWH13 is made up of zone (CWH), subzone (1) and variant (3).

BIOGEOCLIMATIC ZONE: A biogeoclimatic zone is a large geographic area with a broadly homogeneous macroclimate. In response to this overall macroclimate, climax tree species (shade tolerant) occur throughout the zone, most commonly on mesic sites. Characteristic soil-forming processes (e.g. podzolization) and commonly occurring climax shrub, herb and moss species typify a zone. Zones are usually named after one or two dominant tree species. The Ministry of Forests currently recognizes 13 biogeoclimatic zones in the province (Watts, 1983), and examples of 6 of these zones occur within the Park.

BIOGEOCLIMATIC SUBZONE: Biogeoclimatic subzones are subdivisions of zones based on regional climatic differences. Although the climax tree species characteristic of the zone are still common, subtle differences may occur in climax ecosystem associations. Subzones within a zone may have different levels of productivity, with inherent implications for wildlife management.

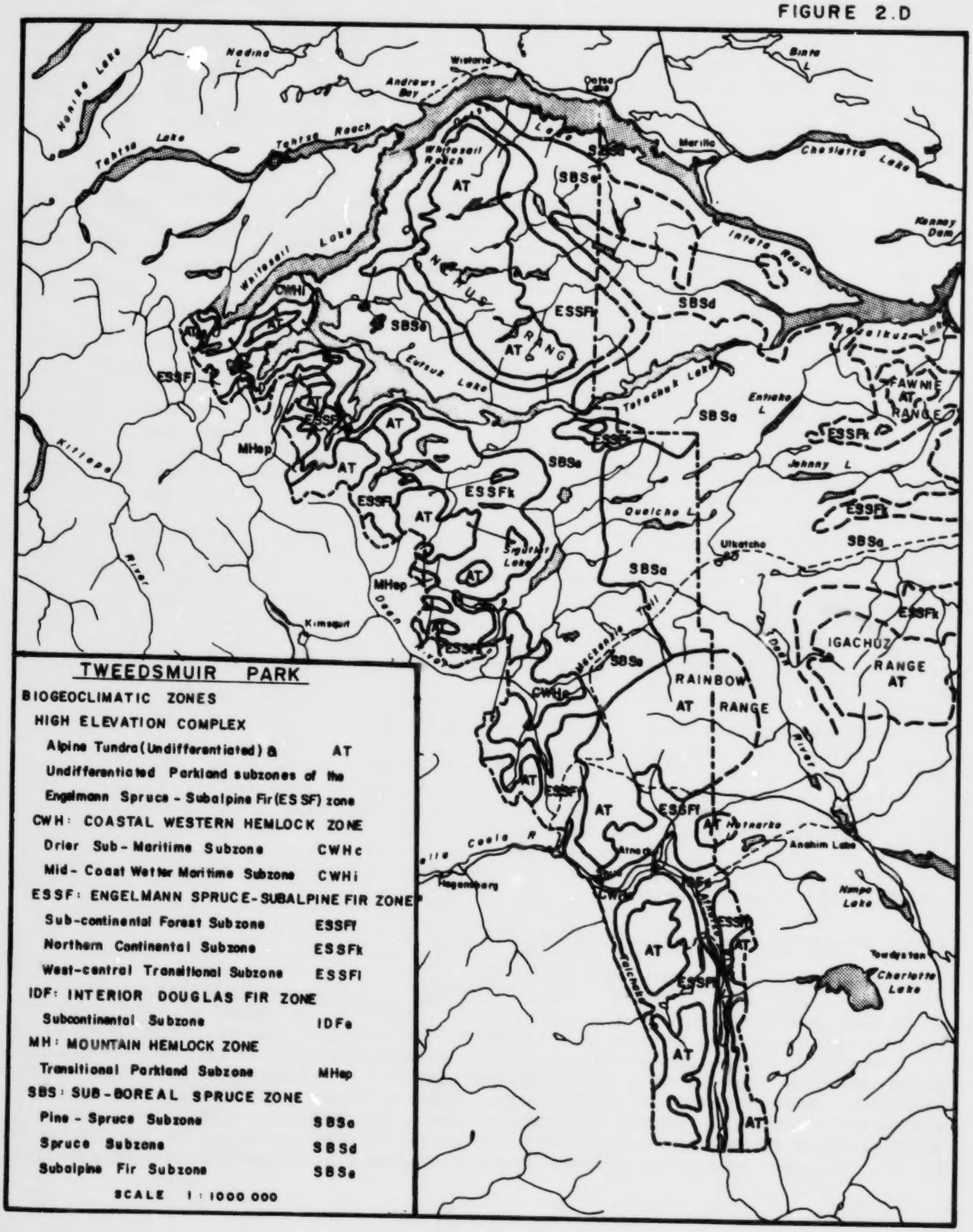
BIOGEOCLIMATIC VARIANT: Variation within subzones is recognized in the form of variants. Variants reflect further differences in regional climate, and are generally recognized for areas that are wetter, drier, snowier, warmer or colder than other areas in the subzone. Differences in vegetation may occur in the form of atypical seral tree species, diverse successional stages or the overall vegetation pattern.

For the purposes of this report, zones and subzones of the Park have been identified, but variants have not been considered. To date, detailed descriptions and mapping of subzones and variants within the Park are only available for the Engelmann Spruce - Subalpine Fir, Sub-Boreal Spruce and Mountain Hemlock Zones within the Prince Rupert Forest District.

2.3.1.2 Biogeoclimatic Zones and Subzones Mapping

Figure 2.D is a map of the biogeoclimatic zones and subzones of the Park, following the Ministry of Forests system outlined above. Since mapping of the Park area has not been completed, all subzones and their

FIGURE 2.D


TWEEDSMUIR PARK
BIOGEOCLIMATIC ZONES
HIGH ELEVATION COMPLEX
Alpine Tundra (Undifferentiated) & Undifferentiated Parkland subzones of the Engelmann Spruce - Subalpine Fir (ESSF) zone AT
CWH: COASTAL WESTERN HEMLOCK ZONE
Drier Sub-Maritime Subzone CWHc
Mid-Coast Wetter Maritime Subzone CWHi
ESSF: ENGELMANN SPRUCE-SUBALPINE FIR ZONE
Sub-continental Forest Subzone ESSFf
Northern Continental Subzone ESSFk
West-central Transitional Subzone ESSFl
IDF: INTERIOR DOUGLAS FIR ZONE
Subcontinental Subzone IDFe
MH: MOUNTAIN HEMLOCK ZONE
Transitional Parkland Subzone MHap
SBS: SUB-BOREAL SPRUCE ZONE
Pine - Spruce Subzone SBSa
Spruce Subzone SBSd
Subalpine Fir Subzone SBSe
SCALE 1 : 1000 000
Nadina L
Andrews Bay
Tahtsa Lake
Tahtsa Reach
Whitesail Lake
Whitesail Reach
Morrie
Chelaslie Lake
Kenney Dam
Intata Reach
Nechako R
Ootsa Lake
Eutsuk Lake
Tatuchaz Lake
Entsako L
Fawnie Range
Johnny L
Quaicho L
Ulkatcho
Igachuz Range
Rainbow Range
Anahim Lake
Kimsquit
Kitlope
Hagensborg
Coast R
Atnarko
Nemiah
Chilcotin
Tsuniah Lake
Charlotte Lake
CWHi
CWHc
ESSFf
ESSFk
ESSFl
AT
SBSa
SBSd
SBSe
MHap

boundaries are liable to change as more research data becomes available. In particular, mapping of the areas south of the Dean River, the Mountain Hemlock zone, and ESSFk subzone near the Dean River and east of the Park are speculative, based on adjacent areas outside the Park and generalized small-scale mapping sources.

The legend accompanying Figure 2.D is a useful list of the zones and subzones, and provides the mapping references. All Park zones and subzones are generally described in the following sections.

2.3.1.3 High Elevation Complex

The High Elevation Complex is unique in that it includes a zone, the Alpine Tundra Zone, and undifferentiated Parkland subzones of the Engelmann Spruce - Subalpine Fir (ESSF) Zone. Lack of subzones and variants is related to an absence of research and mapping for these areas.

ALPINE TUNDRA ZONE (AT)

The harsh alpine climate is cold, windy and snowy, and is characterized by low growing season temperatures and a very short frost-free period. The alpine zone is, by definition, treeless, but tree species are common although in stunted or krummholz form. The most common krummholz species are subalpine fir, Engelmmann spruce, white spruce, mountain hemlock, and whitebark pine. Alpine vegetation is dominated by shrubs, herbs, bryophytes and lichens, but there are many bare areas of rock, ice and snow. Alpine scrub or shrubfield vegetation of low deciduous shrubs often dominates lower alpine areas; the common shrubs are willows and scrub birch. A dwarf scrub of prostrate woody plants is the most abundant form of vegetation in the AT zone as a whole, and is especially found in moister and snowier sites and in mid-elevation sites. Alpine grass vegetation is widespread, especially in drier regions, while herb meadows dominated by broad-leaved forbs are also common in mid and lower elevation alpine. In alpine ecosystems, plants are small, close to the ground, and often separated by bare soil or rock. Soil development is often absent or weak, with regosols (Orthic and Humic) the most common soils.

PARKLAND ENGELMANN SPRUCE - SUBALPINE FIR SUBZONES

Climate of these undifferentiated subzones is a moderated version of the AT zone climate, in response to lower elevation. Tree clumps occur in a mosaic with more open, exposed areas of heath, meadow and grassland. The tree clumps seem to favour sites with moderately heavy snow accumulations, which provide the ideal moisture conditions during the growing season in the drier areas. The subalpine heath is closely related floristically to the AT heath, being dominated by mountain heather, and develops in areas of heavier snow accumulation.

For a detained description and references, refer to Watts, 1983.

2.3.1.4 Coastal Western Hemlock Zone (CWH)

The occurrence of this zone within the Park (see Figure 2.D) is merely an inland penetration of the extensive areas of the zone along the B.C. coast. The zone has wetter and drier subzones which are described later.

The CWH is, on average, the wettest zone, with mean annual precipitation from 1500 the 4400 millimeters, cool summers and mild winters. Western hemlock is the most common species in the forest cover, regenerating freely under the canopy on zonal sites and elsewhere if sufficient acid raw humus or decaying wood has accumulated on the forest floor. Western red cedar occurs frequently, and Douglas-fir is widespread

from Dean Channel southward in the drier subzones. Amabilis fir often dominates higher and more northerly forests, while lodgepole pine is common on drier sites throughout the zone. Characteristic floristic features of zonal ecosystems in the CWH are: (a) the prominence of western hemlock; (b) sparse herb layer; (c) predominance of several moss species. Characteristic soil-forming processes include accumulation of acid organic matter on the forest floor, leaching, eluviation, illuviation, and gleying. The soils of zonal ecosystems are Humo-Ferric Podzols grading, with increasing precipitation, into Ferro-Humic Podzols.

For a detailed description and references, refer to Watts, 1983.

DRIER SUBMARITIME SUBZONE (CWHc)

CWHc is a drier subzone of CWH, and occurs in the Park in the rainshadow climates of the Talchako and Dean River Valleys, although it has not yet been properly researched and mapped in those valleys.

Western hemlock and Douglas-fir are the dominant climax tree species. Detailed documentation on this subzone will be available in upcoming "Land Management Reports" from the Ministry of Forests, and in a document entitled "Biogeoclimatic Units in the Vancouver Forest Region - Differentiating & Accessory Characteristics" by F. C. Nuszdorfer and K. Klinka.

MID-COAST WETTER MARITIME SUBZONE (CWHi)

This wetter subzone occurs in the western Eutsuk and Whitesail areas (Figure 2.D), and west of the Park in the Kimsquit drainage.

Western hemlock and amabilis fir are the dominant climax tree species. Western red cedar is sporadic, and Douglas-fir rare. Sitka spruce, black cottonwood and red alder are locally abundant on floodplain sites. The shrub layer, usually well developed, is often dominated by Alaskan blueberry and oval-leaved blueberry, although devil's club, salmonberry, dogwood, sitka mountain alder and willow may dominate on specific sites. Herbs vary considerably in composition and cover depending on light, moisture and nutrient conditions: bunchberry, creeping raspberry, bluebead clintonia and simple-stemmed twistedstalk are common. A thick continuous moss layer is characteristic of climax forests.

For a detailed description and references, refer to Clement, 1984.

2.3.1.5 Engelmann Spruce - Subalpine Fir Zone (ESSF)

The ESSF zone is widely distributed within the province, encompassing high elevation forests east of the Coast Range mountains south of 57 North latitude. The ESSF of the Park occurs above and contiguous with the Sub-Boreal Spruce, Coastal Western Hemlock and Interior Douglas Fir Zones.

The climate of the ESSF is a relatively moist, snowy, interior subalpine type with a short cool growing season and long cold winters. Trees growing in the zone must be able to tolerate relatively severe winters with long periods of frozen ground. Engelmann spruce, subalpine fir, and lodgepole pine are the major tree species, with the first two the dominant climax trees. Sometimes spruce is dominant, sometimes subalpine fir. The latter seems to be more abundant at higher elevations and in wetter, snowier regions, especially just east of the Coast Range where conditions are transitional between coastal and interior. Lodgepole pine is a widespread seral species after fire, especially in drier regions. Tree species characteristic of lower elevation zones may often be found sporadically at lower elevations of the ESSF e.g. western white pine, western hemlock, Douglas-fir and western red-cedar.

The ESSF occurs on steep mountainous or dissected plateau terrain, in which Podzols are the dominant soils. Lower elevations of the zone are continuously forested, but at higher elevations forest cover becomes clumped as the zone comes transitional to Alpine Tundra in the Undifferentiated Parkland subzones included in the High Altitude Complex already described.

For detailed descriptions and references, refer to Watts, 1983 and Lewis & Inselberg et al, 1986.

SUBCONTINENTAL FORESTED SUBZONE (ESSFf)

This subzone is found above the Subcontinental Interior Douglas Fir and Drier Submaritime subzones described elsewhere, in the Atnarko and Dean River drainages, up to the level of the High Altitude Complex, between approximately 1200 and 1800 meters. This subzone has not been documented as yet; refer to the upcoming references cited in the Drier Submaritime subzone description above for details.

NORTHERN CONTINENTAL SUBZONE (Nechako Plateau Forest Subzone) (ESSFk)

Within the Park, the ESSFk lies above the Subalpine Fir subzone and below the High Altitude Complex, between approximately 1200 and 1400 meters. It has a more continental climate than the other ESSF subzones, being less influenced by Pacific air masses. Subalpine fir, hybrid spruce (white x Engelmann), and lodgepole pine are the major coniferous tree species, with subalpine fir dominant in climax stands and this tree, lodgepole pine and hybrid spruce in seral stands.

High elevation portions of the Nechako Plateau, and steep mountainous terrain, are included in the ESSFk. Soils are medium to coarse textured colluvial and morainal deposits of variable thickness, in the steeper areas, and thick deposits of loamy to clayey morainal material typically on the gentler Plateau slopes, although coarse glaciofluvial materials are locally abundant. Soil types are Humo-ferric Podzols, Podzolic Gray Luvisols and Luvisolic Humo-ferric Podzols.

Details on this subzone are found in Lewis, Inselberg et al, 1986.

WEST-CENTRAL TRANSITIONAL SUBZONE (Morice-Tweedsmuir subzone) (ESSFl)

The ESSFl occurs as a narrow band east of the Coast Range (Figure 2.D). The distribution of the subzone appears to be controlled by a discrete local rainshadow lying in the lee of the Coast Range, differing from the general rainshadow east of the Range in that all but the winter season are significantly drier than normal.

The combination of snowy winters and dry summers of the ESSFl allows the growth of mountain hemlock and amabilis fir. The snowpack is sufficient to reduce ground freezing and is a major source of soil water prior to the growing season. These trees grow only poorly, however, and subalpine fir is dominant on mesic ecosystems. Rugged terrain, rocky and colluvial sites, and a dry growing season results in a relatively large portion of the landscape supporting xeric to submesic ecosystems; whitebark pine is thus distinctive. The drier summer climate also reduces species diversity, particularly in the herb and moss layers. Zonal soil sites usually occur on medium textured glacial deposition materials. Humo-ferric Podzols with thin Hemimor humus forms are the normal soils.

For details and references on this subzone, refer to Lewis, Inselberg et al, 1986.

2.3.1.6 Interior Douglas Fir Zone (IDF)

The IDF in B.C. occupies middle elevations in the drier parts of the Southern Interior and southern Rocky Mountain Trench. Climate is continental, characterized by warm summers, a fairly long growing season, and cool winters. The main factor controlling the climate is the rainshadow in the lee of the mountain ranges like the Coast Range. Substantial moisture deficits may occur during the growing season.

Douglas-fir (the interior variety) is the most frequent tree species in the IDF, and is the shade tolerant species that characterizes the zone. Trembling aspen and hybrid spruce also share wide but lesser distribution within the zone. White spruce occurs on occasion, and several other species further south than the Park. Although mature Douglas-fir forests cover much of the IDF, fire areas are common; fire sites are occupied by seral stands of lodgepole pine.

Zonal ecosystems in the IDF occur on well to moderately well-drained upland sites over morainal deposits. Soils are typically Orthic or Dark Gray Luvisols, and Eutric or Dystic Brunisols. Generally soils in the zone have medium to rich nutrient status.

For details and references on the IDF zone, see Watts, 1983.

SUBCONTINENTAL INTERIOR DOUGLAS FIR SUBZONE (IDFe)

Within the Park, this subzone occurs along the Atnarko River, up to about 1200 meters elevation, at approximately the northernmost limit of the zone. This subzone will be documented in the forthcoming publications cited in the Drier Submaritime subzone description above.

2.3.1.7 Mountain Hemlock Zone (MH)

MH occurrences in the Park (Figure 2.D) are high altitude subzone spillovers of extensive MH zones to the west. Since these areas have not been studied, the occurrences of MH east of the Kimsquit (Coast Range Divide), as documented in Clement, 1984, is only suspected, and therefore mapped occurrences are speculative.

Climate is characterized by short, cool summers and long, cool, wet winters, with heavy snow cover for several months. Mountain hemlock, amabilis fir, and yellow-cedar in wetter habitats, are the most common tree species in the zone. Subalpine fir increases in abundance in those transitional, colder portions of the MH that lie to the leeward of the higher elevations of the Coast Range; in Tweedsmuir Park, for example. Tree growth becomes progressively poorer with increasing elevation due to the shorter growing season, increased duration of snow cover, and cooler temperatures. Forests are not continuous, except at lower elevations. At higher elevations, the forest thins out into parkland, with trees in isolated clumps, irregular small patches and along ridge crests where early snowmelt occurs. The tree clumps form a mosaic with subalpine heath, meadow, and fen vegetation. In the subalpine parkland, lush, diverse herb meadows colonize seepage areas and stream areas.

Characteristic soil processes in the MH are the accumulation of acid, snow compacted organic matter on the forest floor, mycelial Mor humus formation, gleying, leaching, eluviation and illuviation. Podzols and Folisols are the predominant soils.

For details and references on this zone, see Watts, 1983.

TRANSITIONAL PARKLAND SUBZONE (MHep)

The MHep subzone (and adjacent Transitional Forested Subzone (MHe)) has developed in response to the transitional nature of the climate along

the eastern boundary of the Kimsquit drainage. The eastern boundary is delimited partially at the western edge of the Park, coinciding with the divide between coastal and interior physiographical regions; consequently, small areas may lie within the Park, as speculatively mapped in Figure 2.D. The MHep occurs above the MHe subzone, beginning at about 850 meters, although it is not known how extensive it actually is. Eventually, the MHep will grade into High altitude Complex, above 1200 meters.

Extensive bedrock occurs throughout the subzone. The major tree species are mountain hemlock, and also subalpine fir which replaces amabilis fir at these higher elevations, with trees growing in clumps of less than 10 meters in height. The development of plant communities in response to snow accumulation and duration is characteristic. Details of this subzone are found in Clement, 1984.

2.3.1.8 Sub-Boreal Spruce Zone (SBS)

The SBS zone occurs in the central interior of B.C., occupying the gently rolling terrain of the Nechako and Fraser Plateaus and the Fraser Basin between 500 and 1300 meters elevation, with intrusions into adjacent more mountainous areas. The climate of the SBS is continental, with seasonal extremes of temperature, severe and snowy winters, relatively warm, moist and short summers, and relatively low annual precipitation.

The zone is considered as broadly transitional between the true montane forests of Douglas-fir to the south, boreal forests to the north, and subalpine forests at higher elevations. Upland coniferous forests dominate the landscape, with hybrid white sprice, white sprice, and subalpine fir as the dominant climatic climax tree species. Lodgepole pine appears to be a fire-climax species over much of the upper Chilcotin district (eastern Park margins), and this species and trembling aspen pioneer the extensive seral stands. Douglas-fir is a long-lived seral species on dry, rich sites. Alluvial forests of black cottonwood occur to a limited extent on active floodplains.

Wetlands are common and dot the landscape in poorly-drained post-glacial depressions and river ox-bows. Wetland community types include sedge marshes, shrub fens of scrub burch and willow, treed fens and swamps with black and hybrid white spruce, and black spruce bogs. Upland ecosystems have soils primarily from the Luvisol, Podzol, and Brunisol soil orders. Brunisolic and Orthic Gray Luvisols and Podzols are the most common soils found on the abundant morainal deposits. Imperfectly to poorly-drained sites typically have Gleysols or gleyed subgroups of Luvisols, Podzols or Brunisols.

For details and references on the SBS zone in general, see Watts, 1983.

PINE - SPRUCE SUBZONE (SBSa)

SBSa occurs on the northeastern margins of the Park (Figure 2.D), between 900 and 1300 meters. Major tree species are lodgepole pine and hybrid white spruce. The understory is sparse shrub and herb layers, and there are moderate moss layers with many lichens on mesic sites. Zonal soils are Brunisolic Gray Luvisols and Dystric Brunisols, with Hemimors humus form.

For details and references, see Lewis, 1986 and Pojar, 1984.

SPRUCE SUBZONE (SBSd)

Small patches of SBSd occur near the shores of Ootsa Lake and Chelaslie River, in the northeast corner of the Park, up to 1100 meters elevation. Dominant tree species are hybrid white spruce, lodgepole pine

and trembling aspen. Understory features are diverse shrubs and herbs, with grasses common. Zonal soils are similar to SBSa, but humus forms are both Hemimors and Mormoders.

For details and references, see Lewis, 1986 and Pojar, 1984.

SUBALPINE FIR SUBZONE (SBSe)

The SBSe covers extensive areas of the Nechako Plateau within the Park, and is replaced by the Northern Continental (ESSFk) subzone at elevations above approximately 1200 meters. Dominant tree species are subalpine fir, hybrid white spruce and lodgepole pine. There are poor to moderate shrub and herb layers, with lush moss. Zonal soils are Gray Luvisols, Dystic Brunisols and Humo-Ferric Podzols, with Hemimors humus form.

Again, for details and references, see Lewis, 1986 and Pojar, 1984.

The occurrences of all zones and subzones are mapped on Figure 2.D, the legend to which provides a summary list of zones and subzones.

2.3.2 Fauna

The great variety in the Park's climate, landforms and biogeoclimatic zones leads to much diversity in the species of wildlife and fish found within the Park. The following sections describe the occurrence and characteristics of the Park's many wildlife and fish species.

2.3.2.1 Wildlife

The Park's many diverse landscapes and biogeoclimatic zones, containing numerous different types of wildlife habitat, have enabled a wide selection of animal species to establish themselves in relative seclusion.

Tweedsmuir Park's wildlife has been sporadically studied in the last decade or so, and consequently, gaps in data remain. The basic reference is Hatter & Sather, 1982, which is based on wildlife inventory work in 1973 and 1975 (Hazelwood, 1975), further surveys, and information from guide-outfitters and residents. Specific research on certain species, especially woodland caribou, has been completed since then, and continues. All information on ranges, populations and such should be regarded as tentative. The major species found in the Park, their ranges, populations, and migration areas, are described in the subsequent parts of this section, and in Figure 2.E. A few notes on hunting regulations are presented at the end of this section.

WOODLAND CARIBOU: Although outnumbered by moose, woodland caribou (henceforth 'caribou') are the most studied of the wildlife species within the Park. In response to potential habitat losses because of planned logging outside the eastern boundary of the Park, studies have been jointly funded by the B.C. Government, University of B.C, and logging companies to research seasonal ranges, habitat use and food habits of caribou of the Park (to help minimize the effects of logging) and to determine population size and survival rates (to evaluate status and limiting factors). Following an initial summary of caribou knowledge by Hatter, 1979, study findings have been updated in frequent progress reports; Marshall, 1984, 1985 (several), 1986, and Cichowski, 1985, 1986.

Caribou tend to congregate in herds and to migrate in relatively regular patterns for the different annual functions; calving (spring), post-calving, fly-season browsing, fall range, rut, winter range. Dates

and exact migration routes vary in response to differing environmental conditions (especially snow depth) from year to year.

Two herds of caribou that spend part of their time within Tweedsmuir Park have been identified; these have been called the Tweedsmuir-Entiako and the Rainbow herds. Nineteen adult female caribou from the Tweedsmuir-Entiako herd, and four from the Rainbow herd have been fitted with radio collars and tracked over the last few seasons. This together with ground and aerial checks, has produced considerable data on migration patterns, and survival rates.

The main data gap concerns the actual population numbers of the herds. The Tweedsmuir-Entiako herd has been estimated as consisting of 500 animals (Marshall, 1985), but more exact figures may be an outcome of 1986-7 winter field work (Marshall, pers. comm.). Estimates of Rainbow herd sizes have been as widely divergent as 100 and 450 (Wood, 1967). Ranges for the two herds are mapped on Figure 2.E.

The most significant information to date concerns the migration routes of the two herds. Each herd spends only a few summer months in the Park before moving further east for over-wintering, as shown on Figure 2.E; most of the Tweedsmuir-Entiako herd moves down the Chelaslie and Tetachuck Valleys east to the Fawnie Range / Entiako River Valley between late October and December. The tracked members of the Rainbow herd move to the Ilgachuz Range east of the Park in the same period (Cichowski, 1986). Spring return routes seem to retrace these same less-snowy valley bottoms (Marshall, and Cichowski, 1986). From this information it is clear that caribou habitat is not completely protected by the Park in its present boundaries, and that forestry and hunting east of the Park may pose a threat to one of the Park's most valuable resources, if not properly regulated.

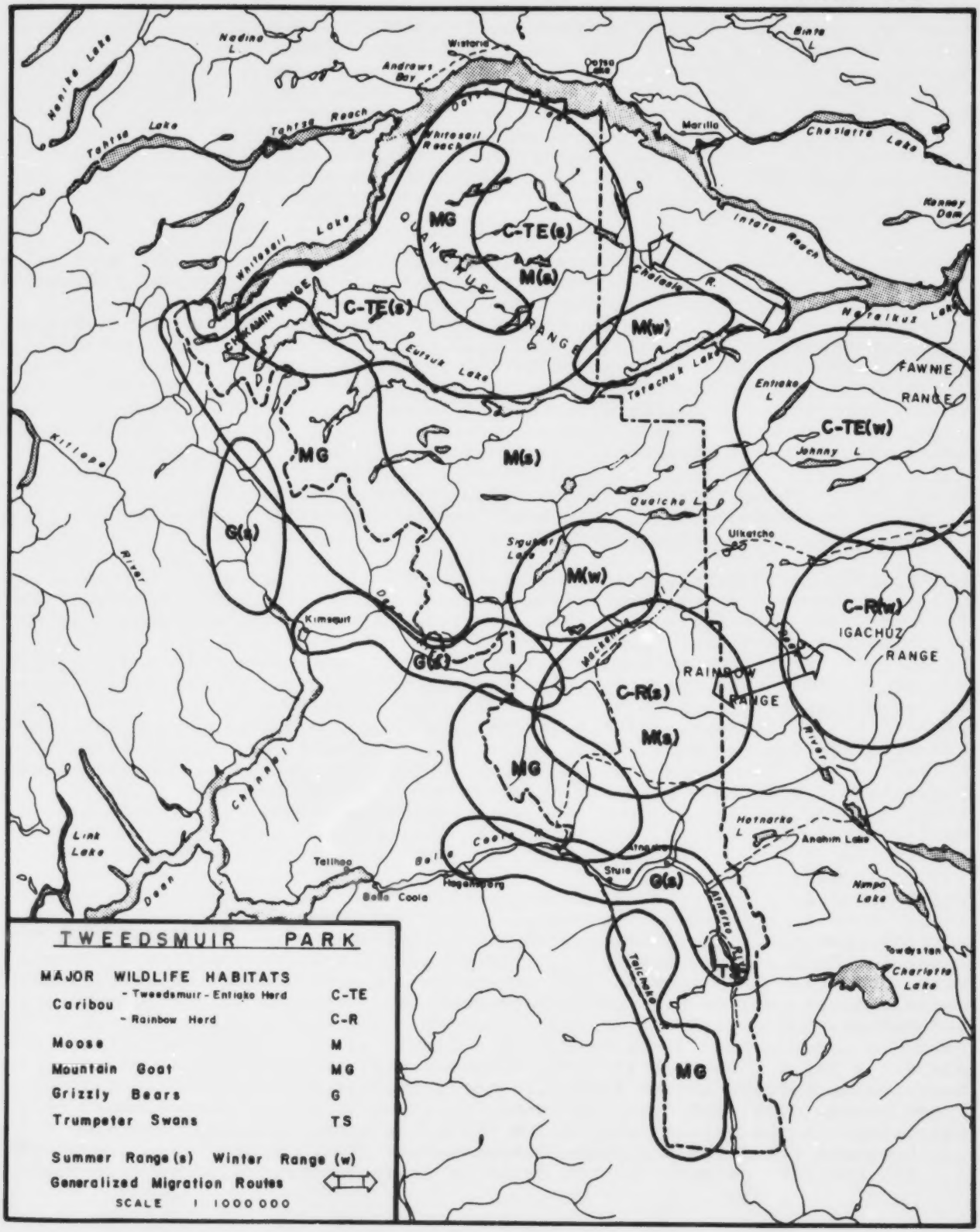
Although the Rainbow herd shows healthy population increases, there is a very high mortality rate among both adults and calves in the Tweedsmuir-Entiako herd. Herds have been generally known to increase in cycles within the Park and elsewhere, so the current decreases may be part of a cycle of population trend. Research continues into the causes of declining numbers.

MOOSE: Moose are common in all areas of the Park, and are the most populous and hunted big-game species. Data on these animals is limited to spot-checks in specific areas, unplanned sightings, and estimation. Moose have different characteristic summer and winter ranges: calving ranges are remote and inaccessible dense forests or lake peninsulas and islands in the summer range. Summer ranges occur throughout the Park north of the Atnarko (see Figure 2.E), although certain areas are most favoured.

Most summer-range moose now leave the Park for the winter since traditional winter ranges were largely eliminated by the Ootsa Lake hydroelectric scheme in 1954. New winter ranges are thought to be north of the Park alongside Ootsa and Francois Lake and the Nadina River, and within the Park alongside some of the major lakes and in burn areas (Figure 2.E). Recent reconnaissance flights have identified the scale of wintering areas at the foot of the Rainbow Range (Jones 1983, 1984, Langin, 1986); the Sigutlat burn between Sigutlat Lake and the Dean River was found to contain over 360 moose in winter 1984, and 234 in 1986, despite double the 1984 snow depth. Wetlands and riparian willow communities are also in use as winter range, but burn areas seem to be preferred.

Migration routes are not known, but the distance of around 120 kilometers has been suggested. Eutsuk Lake and Chelaslie River are suspected routes, as well as across ice-covered Whitesail Lake.

FIGURE 2.E



TWEEDSMUIR PARK

MAJOR WILDLIFE HABITATS

Caribou	- Tweedsmuir - Entsako Herd	C-TE
	- Rainbow Herd	C-R
Moose		M
Mountain Goat		MG
Grizzly Bears		G
Trumpeter Swans		TS

Summer Range (s) Winter Range (w)

Generalized Migration Routes

SCALE 1 1000 000

MOUNTAIN GOAT: Mountain goats are distributed throughout the highland areas of the Park, although concentrated on the steepest mountains of the Coast and Chikamin Ranges in the Park's western extremities. The known ranges are shown on Figure 2.E; there is no information for the Atnarko and western Interior Plateau areas. Mountain goats prefer high elevation alpine areas for summer range, especially north and east-facing slopes. In winter, range depends on snow conditions but includes snow-free slopes near ravines, windblown slopes and ridges, south-facing rock outcrops, and krummholz alpine fir slopes. Populations have been estimated as 24 in the Quanchus area north of Eutsuk Lake, 245 in the Coast-Chikamin area, and 11 in the Atnarko area, with unknown but low numbers on the Interior Plateau. (Hatter & Sather, 1982)

GRIZZLY BEAR: The greatest concentrations of grizzly bears in the Park are found along the Atnarko River during the fall salmon run, although they are found in lesser numbers throughout the Park. They are common in the north of the Park, but vary seasonally there, too. Some notable grizzly sighting areas are shown in Figure 2.E. They tend to favour south-facing avalanche slopes in Spring, and valley bottoms and avalanche slopes in Summer. Since grizzlies are hard to locate and identify, population estimates are very rough; fall populations are 60 in the north of the Park, 30 in the Atnarko area, and unknown but less dense concentrations in the Interior Plateau areas (Hatter & Sather, 1982).

BLACK BEAR: These animals appear to be fairly common in the Park, but little is known of numbers. Typical locations would include all grizzly areas in Figure 2.E, plus others.

FURBEARERS: Red squirrels are the most common, and are ubiquitous in the Quanchus, Coast and Chikamin Ranges and Interior Plateau from valley bottom to tree-line, especially in balsam forests. Beaver are only active where water bodies stand next to deciduous cottonwood, willow or aspen, but may be locally significant, as for example where they have obstructed the outlet of Mink Lake and interfered with the upstream movement of fish. Marten are relatively common, with muskrat, weasel, mink, fisher and otter present but infrequent. Of the larger furbearers, red fox, coyote and lynx are considered uncommon, while wolverine and wolf are more frequent. Wolverine are found in the Quanchus, Coast and Chilcotin Ranges, but population totals are unknown. Wolves are concentrated in the north of the Park, and population figures seem to have varied considerably following wolf control in 1956-7, hunting, and the cyclical nature of predator species.

SMALL MAMMALS: Nine species of very small mammals are found in the Park: deer mice, red-backed voles, meadow voles, long-tailed voles, mountain-heather voles, Cinereus shrews, navigator shrews, meadow jumping mice, and Northwestern chipmunks. The first two are the most common in the Park, and all favour avalanche slopes and sedge meadow areas. Small mammals found include the pika, snowshoe hare (Plateau only), porcupine, and marmot.

BIRDS: A large number of bird species have been observed in the Park. The most famous species in the Park are the Trumpeter Swans of Lonesome Lake. These swans over-winter at Lonesome Lake and nest in the summer near Fairbanks and the Alaska coast. The flock has grown considerably since it has been fed first by the pioneer homesteader Ralph Edwards (see Section 3.2.2), and more recently by his daughter Trudy Turner, using barley flown

in by the Canadian Wildlife Service. The flock averages over 300 birds, with a maximum of 512 in 1971. The swans and their provisioners at Lonesome Lake have recently been documented and illustrated in National Geographic magazine (Bergman, 1985).

Annotated lists of bird species observed in the Park are available in Hazelwood, 1975, and Hatter & Sather, 1982.

HUNTING: Hunting regulations as set by the Ministry of Environment and Parks apply to Tweedsmuir Park. The accompanying Figure 2.F illustrates the major area-based regulations applicable in 1986. A summary of the regulations is in Appendix 9.3.

2.3.2.2 Fish

The fish resources of the Park are extremely valuable as part of the ecosystem, and for sport and commercial fishermen. The many lakes & rivers contain a diversity of both sea-run and freshwater species. Since lakes and rivers in the Park are, in general, difficult to access, and thus little used, it is not surprising that data on the fisheries resources are sporadic. Although a good deal of information is available on the relatively heavily-fished rivers and lakes near Highway 20 and the Dean River, other areas have been given only cursory inventory surveys, or have never been studied at all.

Listings of the lakes and minor rivers and streams that have been inventoried, along with information on species and abundance, are presented in Appendices 9.5 and 9.6. The locations of inventoried lakes are shown on Figure 2.G which is keyed to the listings. In addition, a written description of information relevant to the fishery resource is presented for the inventoried lakes in Appendix 9.7.

Besides lake and inlet/outlet fishery resources, the Park contains two major river systems of great significance. These rivers, the Bella Coola and the Dean are described below.

BELLA COOLA RIVER SYSTEM (ATNARKO, HOTNARKO, TALCHAKO, ETC.)

The Bella Coola River and its tributaries contain one of B.C.'s most diverse and important fisheries. As a whole, the system contains the 5 species of Pacific salmon, steelhead trout, resident rainbow trout, sea-run and resident cutthroat trout, sea-run and resident Dolly Varden, mountain whitefish, and other species (T. Wilkinson, pers. comm.).

Steelhead trout run up-river all year, with peaks in July-August (Summer-run), October-March (Early Winter-run) and March-June (Spring-run). They occur throughout the river system, especially in the lower 30 kilometers of the Atnarko, and Lonesome Lake areas (Wilkinson, 1978). Run sizes are estimated at 2340 (Spring-run), 300 (Summer-run) and 500 (Early Winter-run), with escapement to spawning grounds (i.e. run less harvesting) of 1200, 200 and 400 steelhead respectively. 85% of harvesting takes place in the Spring-run, with the Indian food fishery taking about 2/3 of the harvest, and sport anglers the remaining third. The latter group actually release all but 28% of their total catch; catch figures thus represent only fish caught and kept (Wilkinson, 1985). Angling is prohibited above the Atnarko campground in the Park, and less than 5% of total angling effort on the Bella Coola River system takes place upstream of the Atnarko/Talchako confluence (i.e. within the Park). (Wilkinson, 1979).

Cutthroat trout (sea-run) are most common in the Bella Coola River itself and, as resident fish, fairly common upstream from Stillwater Lake.

Resident rainbow trout occur especially in the Atnarko headwaters except Hotnarko Lake, with spawning in side channels and tributaries of the Atnarko.

FIGURE 2.F

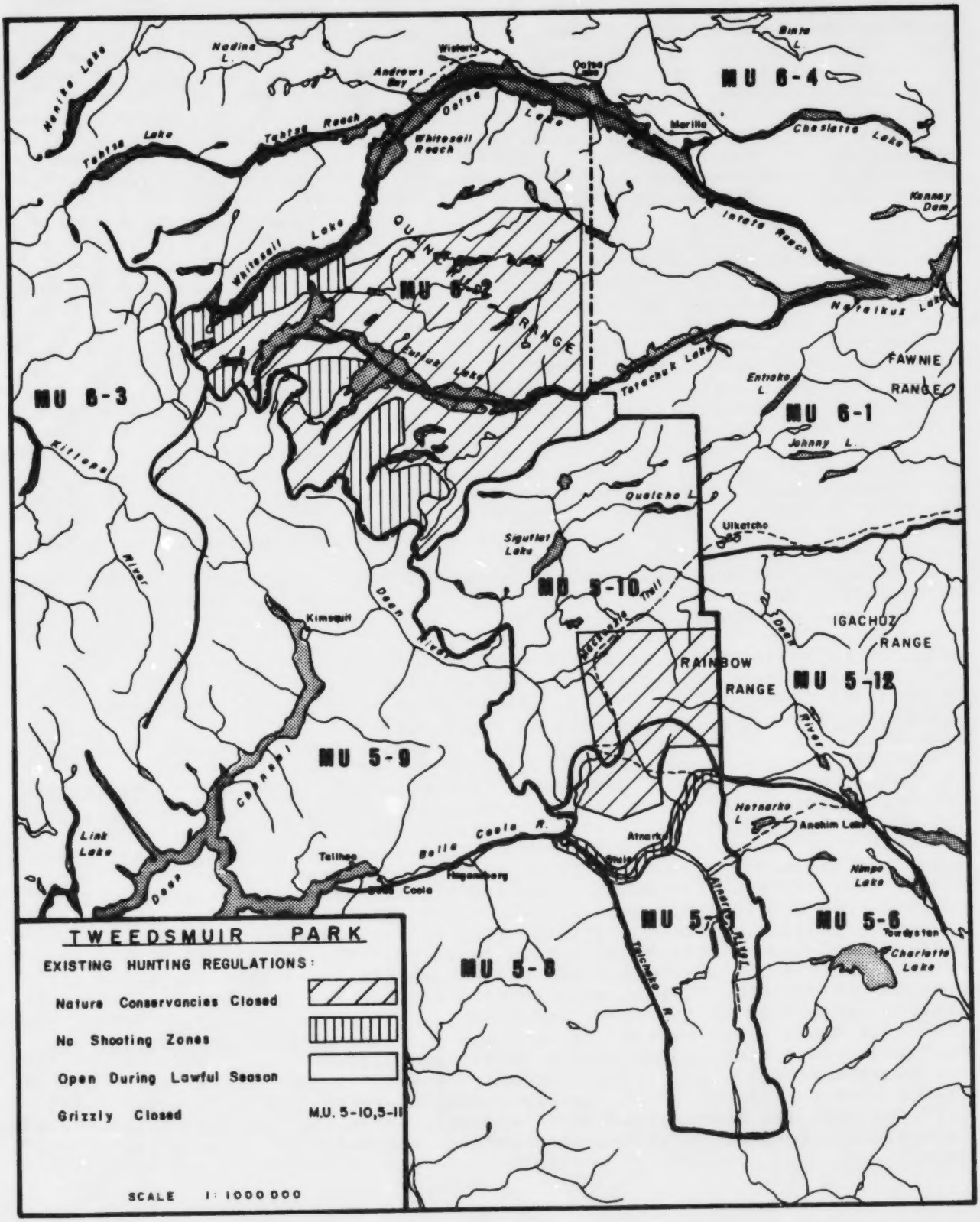
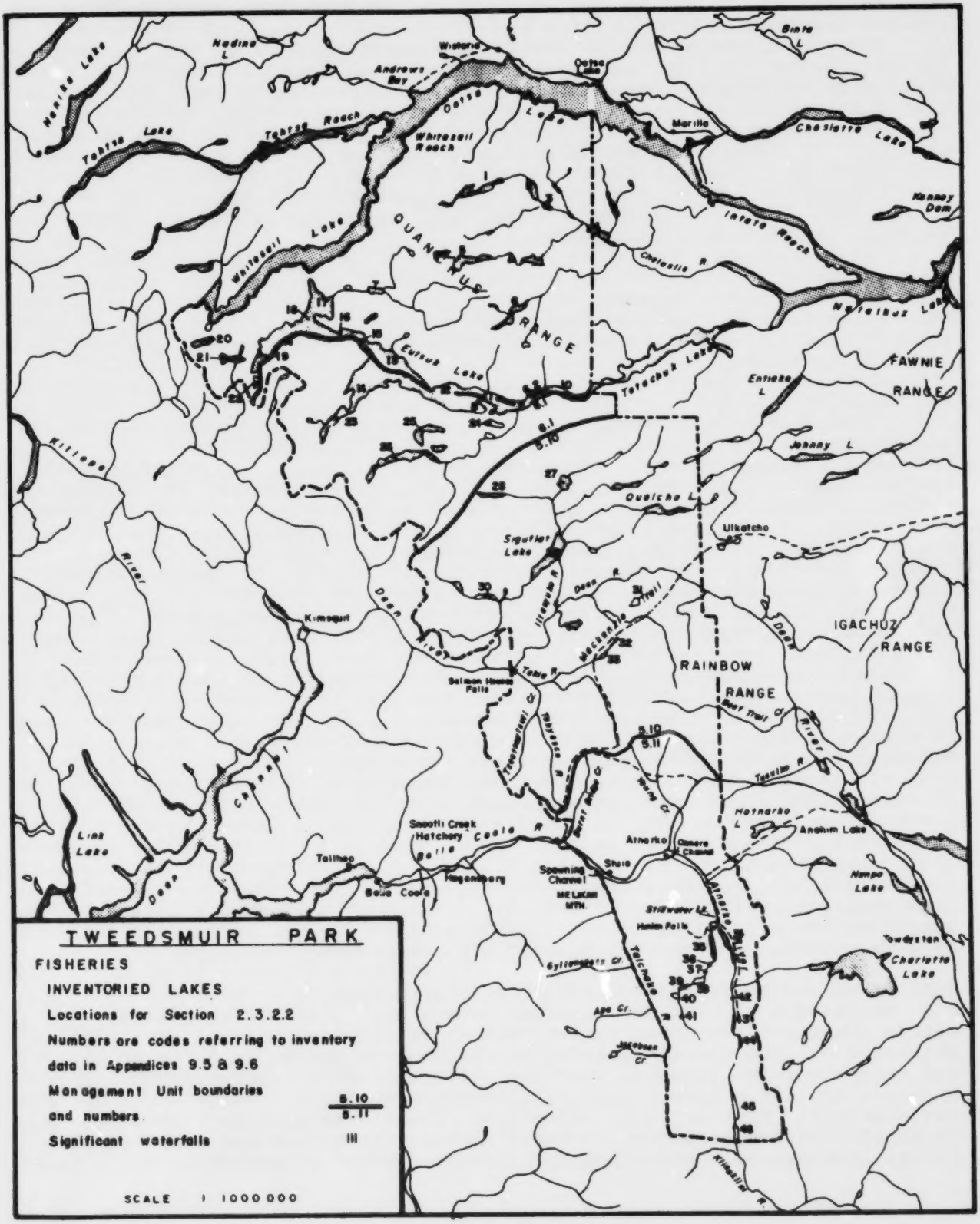

MU 6-4
MU 6-2
MU 6-3
MU 6-1
MU 5-10
MU 5-12
MU 5-9
MU 5-7
MU 5-6
MU 5-8
Nadina L.
Wistaria
Andrews Bay
Tahtsa Lake
Tahtsa Reach
Whitesail Lake
Whitesail Reach
Ootsa Lake
Morrison Lake
Chelaslie Lake
Kenney Dam
Intata Reach
Nechako River
Tsuiua Lake
Tetachuk Lake
Entrake L.
FAWNIE RANGE
Johnny L.
Quaicho Lake
Ulkatcho
Sigutlet Lake
Kimsquit
Dean River
IGACHUZ RANGE
RAINBOW RANGE
Hotnarko L.
Anahim Lake
Nimpo Lake
Charlotte Lake
Link Lake
Talhko
Bella Coola R.
Hagensborg
Atnarko
Talchako R.
Kitlope River
Channel
TWEEDSMUIR PARK
EXISTING HUNTING REGULATIONS:
Nature Conservancies Closed
No Shooting Zones
Open During Lawful Season
Grizzly Closed
M.U. 5-10,5-11
SCALE 1:1000000

FIGURE 2.G


TWEEDSMUIR PARK
FISHERIES
INVENTORIED LAKES
Locations for Section 2.3.2.2
Numbers are codes referring to inventory data in Appendices 9.5 & 9.6
Management Unit boundaries and numbers. 5.10 / 5.11
Significant waterfalls III
SCALE 1 1000000
Nadina L
Andrews Bay
Whitesail Reach
Tahtsa Reach
Tahtsa Lake
Whitesail Lake
Ootsa Lake
Morrilla
Chelaslie Lake
Kenney Dam
Intata Reach
Natalkuz Lake
QUANRUA RANGE
Chelaslie R
Euksut Lake
Tetachuk Lake
FAWNIE RANGE
Entsika L
Johnny L
Quaicho L
Ulkatcho
Sigutlat Lake
Deep R
Trail
Kimsquit
Dean River
Wacheete
RAINBOW RANGE
IGACHUZ RANGE
Salmon House Falls
Tahla R
Bear Trail Cr
Tsaytiss R
Hotnarko L
Anahim Lake
Smoothi Creek Hatchery
Coola R
Atnarko
Omeara Channel
Spawning Channel
Stuie
Tallheo
Bella Coola
Hagensborg
Link Lake
Dean
Kimsquit River
Nampo Lake
Stillwater Lk.
Hanham Falls
Gyllenspetz Cr.
Taichaka R.
Ape Cr.
Jacobsen Cr.
Charlotte Lake
Kilbella R.

Mid-sized sea-run and small resident Dolly Varden (a few old large ones remain) are found in the Atnarko, and tributaries, with spawning as rainbow trout.

The pink salmon run in the Bella Coola System is one of B.C.'s largest, occurring each year in July-August, and comprises 90% of all fish species in the System. The Atnarko is prime spawning and rearing habitat for 72 kilometers.

Chum salmon are the second most numerous fish, with a late summer and a fall run. They utilize the Atnarko and its tributaries, especially downstream of Lonesome Lake, and the lower Talchako. (Hazelwood, 1975).

Coho salmon run in the system between August and October, and utilize the Atnarko and tributaries, especially upstream of Tenas Lake, for spawning and rearing. (Hazelwood, 1975).

Chinook salmon run up the System in May to July. They spawn throughout the system but especially between Stuie and Stillwater Lake. (Fisheries & Oceans, Canada, 1981).

Sockeye salmon run upstream to spawn in September, favouring the upper reaches of the Atnarko between Stillwater and Tenas Lake, although other areas are utilized.

The actual sizes of salmon runs, expressed in terms of escapement to the spawning grounds, are detailed in Appendix 9.8.

Although the mainstream Atnarko River is excellent fish habitat in most sections, this is not true of its tributaries. All tributaries between Stillwater Lake and Burnt Bridge Creek descend very steeply, and are unsuitable for fish habitat, although the flatter upper reaches of Young Creek and the Hotnarko River have some habitat capability. The Talchako River, forming part of the west Park boundary, with its glacial flour load and cold temperatures, is far less favourable for fish than the Atnarko; spawning does, however, take place downstream of Jacobsen Creek in sheltered places and tributaries, with coho and rainbow trout furthest upstream, chinook from Ape Creek, and chum from Gyllenspetz Creek (Cleator, 1977); excellent spawning habitat exists downstream of Melikan Mtn., with Dolly Varden, steelhead and all salmon species. This river section is becoming more accessible as logging roads are pushed further up the west side of the valley towards Gyllenspetz Creek.

Enhancement of fish resources has been practiced on the Bella Coola River system and continues. A B.C. Government hatchery near Stuie formerly enhanced odd-year pink salmon runs, and was closed in 1980. Since 1978, a Federal hatchery on Snootli Creek (near Hagensborg) has enhanced chum and chinook salmon runs. The Camera Channel of the Atnarko River near Young Creek was enhanced in 1981 to improve the spawning habitat. Waters in the indefinite drainage above Rainbow Lake have been deliberately diverted south into Knot Lake, to keep the Atnarko clear of the silt-laden runoff that originated from this area. Most recently, a new spawning channel has been completed (1986) at Stuie by Fisheries & Oceans, Canada. The intention is to stabilize the Bella Coola River system pink salmon run on a long-term basis, and some 50,000 fry will be produced each year.

DEAN RIVER SYSTEM (TAKIA, TAHYESCO, BEEF TRAIL, ETC.)

The middle section of the Dean River, and its main tributaries, lie within the Park. The Dean system salmon run is dominated by pink salmon, but all 5 Pacific species are found: salmon abundance, in terms of optimum and escapement to spawning grounds, is detailed in Appendix 9.8. Prime spawning habitat exists particularly at the outlet of Tanya Lakes on the Takia River. This river, and to a lesser extent the Tahyesco and Taiataeszi, are considered the main habitat for salmon and also steelhead in the Dean System, even though the 6-meter-high Salmon House Falls near

the Park boundary limit migration up the Takia River to larger fish at higher-flow times of the year.

No inventory data exists of fish abundance, other than for salmon. However, a 1973 survey noted 500 steelhead in one short section of the Takia River (Dolighan, 1985 and Hazelwood, 1975).

The Iltasyuko River is interrupted by a 20-meter falls near the Dean confluence, and thus contains no anadromous (sea-run) fish. The Dean River itself contains rainbow trout within the Park. Beef Trail Creek and the Tusulko River contain Dolly Varden within their upper reaches (within the Park) and rainbow trout further downstream beyond the Park.

All waters within the Park are subject to fishing regulations. These are summarized in Appendix 9.4.

2.3.3 Infestations

The forests of Tweedsmuir Park have been extensively attacked by bark beetles in recent years. Mountain pine beetles (Dendroctonus ponderosae Hoskins), spruce beetles (Dendroctonus rufipennis Kirby) and western balsam bark beetles (Dryocetes confusus) are the primary species.

Mountain pine beetle attacks have occurred throughout the Park with heavy concentrations in the Dean and Atnarko River valleys. Virtually all the pine stands in the Atnarko are under varying degrees of attack and it appears that the area of attacked pine has increased by at least 50% since 1982. Scattered light attacks have occurred elsewhere and the populations in the northern part of the Park have potential to expand.

Spruce stands have been severely attacked throughout the Park and the damage is probably related to a major windstorm in 1978. There are now extensive areas of standing dead trees with some areas showing up to 50% mortality. However, it appears that there is little evidence of current beetle activity.

Balsam beetles are considered to be at epidemic proportions in the higher elevation stands from Heckman Pass northward. The damage is probably related to the 1978 windstorm as well. Many areas show up to 30% tree mortality.

Based on an old Forest Service inventory of 1955 and 1956, it has been estimated that over 75% of the forests in Tweedsmuir Park are in a mature or over-mature state; that is, over 80 years for pine and over 120 years for balsam fir and spruce. Since bark beetles are predisposed to attacking mature trees, it is not surprising that the beetle attacks are extensive. In fact, these attacks can be considered as a normal occurrence in a mature forest and a normal agent of forest successional patterns in the absence of fire.

2.3.4 Fire Ecology

The fire history of the Park has not been thoroughly studied but Ministry of Forests records show that only approximately 9,600 hectares have burned in the last 25 years. These burns are composed of two large fires in the Dean River near Sigutlat and Tanya Lakes with numerous smaller burns scattered throughout the Park.

The succession of forest seral stages found in the recently burned areas adds further complexity to the vegetation mozaic. These areas add diversity to the plant and animal complex and this is the normal state. Most of the Park is in an aged condition as indicated by the 75% maturity of its forests. Thus, species which require climax forest conditions are favoured over species which require early seral conditions.

Tweedsmuir Park's vegetative diversity is extremely important to wildlife values as it provides a multitude of habitat types and "niches" which ensure survival of a wide variety of species. This diversity gives

stability to Park ecosystems. The Park's large size will be an important factor in maintaining continuous habitat pathways and genetic dispersal routes for its floral and faunal components. As time passes, the Park will become important because the surrounding managed forest lands will lose species diversity through logging, fire suppression and other habitat pressures.

The role of forest fires is very important to maintaining diversity in the vegetative mosaic. Normally, fires would return every 100 - 350 years in any given forest of the Park, re-creating pioneer forest communities and all those species associated with this seral stage. Without fires, infestations or disease become the terminating agent, early successional species are replaced by shade-tolerant species growing in the understory, and the entire forest proceeds towares a climax association.

The forests of the Park are currently experiencing significant change caused by the infestations. The bark beetles have killed off large areas and created some very large snag forests. Normally, this would set the stage for forest fires by creating large amounts of dry fuels; however, fires have all but been eliminated from the Park through suppression. Unless fires are re-introduced, this process of forest replacement through infestation and disease will be the only form of forest renewal and become more or less continuous throughout the Park. An element of forest diversity will be lost because early forest successional stages caused by fire will be drastically reduced.

As surrounding forest management practices eliminate older stands, forest pests will be reduced along with them. Eventually, the Park will be the only major source of forest pests in the area and there will be increasing pressure to manage the forests of the Park to keep pests from infesting surrounding commercial forests.

3.0 CULTURAL RESOURCES

The cultural heritage of Tweedsmuir Park is inextricably linked to situations and events of local, regional and national significance; thus, discussion of the cultural resources and history of the Park by necessity must include close study of the history of surrounding areas and peoples. Indeed, since the Park has few permanent residents and possesses few attributes to encourage permanent settlement, it is inevitable that the cultural resources and history depend on events and forces from beyond the Park area.

3.1 Archaeology

Although it is known that the entire area surrounding Tweedsmuir Park both east and west of the Coast Range has been continuously occupied for thousands of years, there is no historical documentation until the arrival of the white man. Information on this prehistory period is obtained from remains and excavations, various scientific processes, inference and comparison, and through Indian legends and recollections.

Popular anthropological theory has long held that North American Indians are of Asiatic origins, from various sources and arriving at different times to be destroyed or settle and bring their own religion, culture and language which eventually became altered by isolation, evolution and adaptation.

The following section outlines what is known of the native Indians of the Tweedsmuir Park area. All places and archaeological sites referred to are shown on Figure 3.A.

3.1.1 Interior Indian Culture

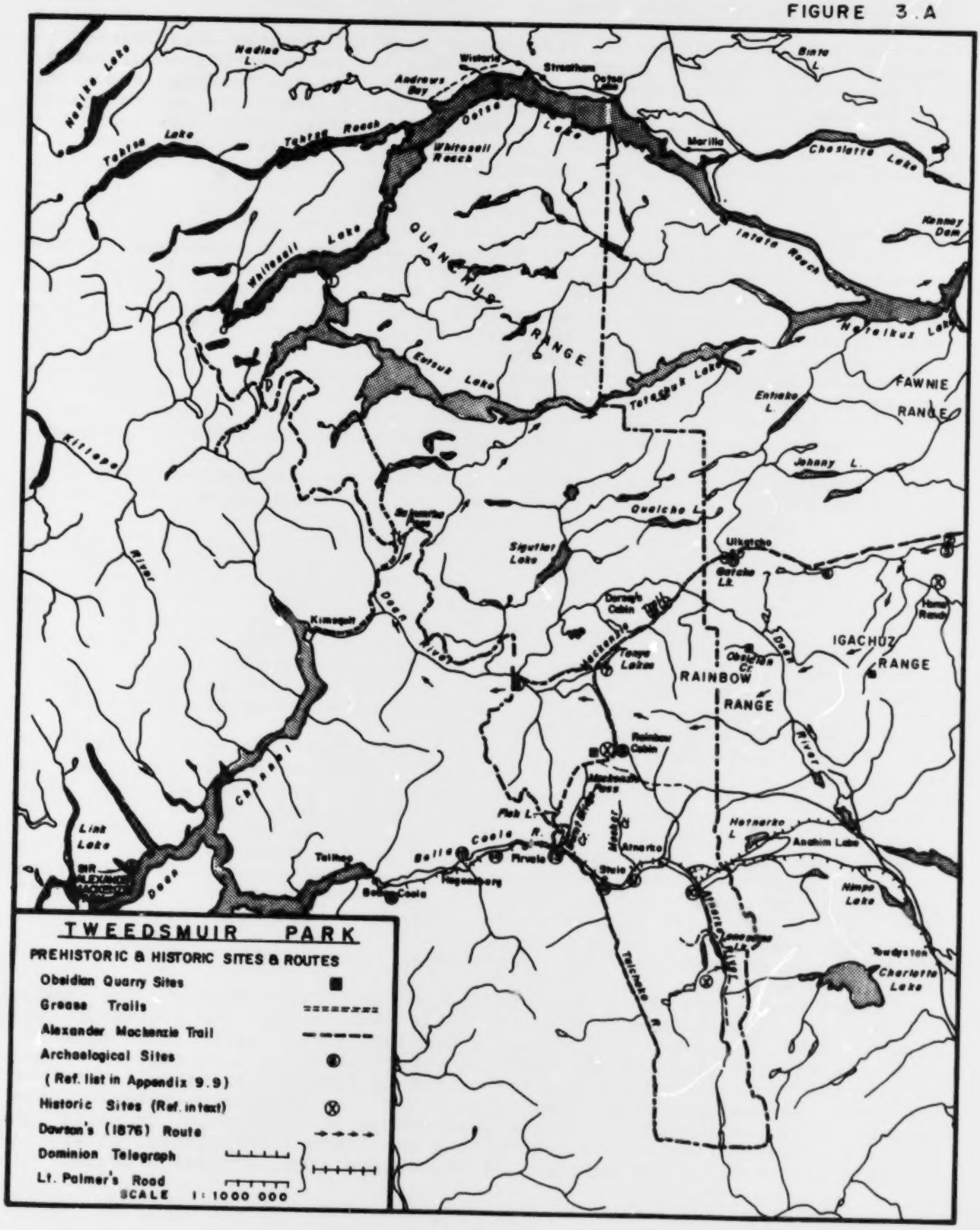
It is likely that the areas surrounding Tweedsmuir Park were inhabited following the final retreat of the Pleistocene ice sheets, which would be some 8 or 9 thousand years ago in the Interior Plateau (Sneed, 19__).

The Interior Plateau comprises the aboriginal territory of 3 bands of southern Carrier Indians; Nazko, Kluskus and Algatcho. Members of the Athapascan language family, the Carriers were hunters and gatherers. Their lifestyles exhibited an unusual mix of interior and coastal influences to which their trading had exposed them.

Of particular significance to the Park are the trading activities of the Southern Carriers. Although there is no documentary evidence, it is presumed that relations with coastal Indians were sometimes good and that trade between the two areas was active, since both had items of use to the other. The trail followed by Alexander Mackenzie to the Pacific Ocean in 1793 (see section 3.2.1 below) had been in use for centuries prior to his journey. In fact, Mackenzie referred to it as "the great road" and wrote that the Indians had told him that the road was "good and well traced" (Lamb, 1970). This 300 kilometer overland route west from the confluence of the Blackwater and Fraser Rivers to the villages of the Bella Coola Indians on the coast was one of several trade routes connecting the interior to the coast.

These trails are often referred to as "the Grease Trails", for among the articles carried inland from the coast was the oil or grease of the eulachon fish, a member of the smelt family. Every spring the spawning runs drew the Interior Indians down to the coast where they either traded or paid the resident Indians for the right to fish for eulachon. Some of the catch was eaten fresh, some dried, and the rest processed for its valuable oil. As eulachon oil, unlike most other fish oils, is solid at ordinary temperatures, does not go rancid and lasts indefinitely, it was a valuable preservative for berries and meats, medicine, and was a prized

FIGURE 3.A


Natalkuz Lake
Tahtsa Lake
Tahtsa Reach
Whitesail Lake
Whitesail Reach
Ootsa Lake
Wistaria
Streatham
Andrews Bay
Hadina L.
Morrison
Binta L.
Chesaletta Lake
Kenney Dam
Intata Reach
QUANCHUS RANGE
Natalkuz Lake
Eutsuk Lake
Tetachuck Lake
Entsako L.
FAWNIE RANGE
Johnny L.
Owaicho L.
Kitlope River
Kimsquit
Dean River
Sigutlat Lake
Ulgatcho
Gatcho Lk.
Dorrough Cabin
Mackenzie
Tanya Lakes
Obsidian Cr.
RAINBOW RANGE
IGACHUZ RANGE
Rainbow Cabin
Mackenzie Pass
Fish L.
Blackwater River
Hotnarko L.
Anahim Lake
Nimpo Lake
Chilcotin River
Tsuyeston
Charlotte Lake
Lost Lake
Chuchi
Tatlayoko
Bella Coola R.
Firvale
Stuie
Atnarko
Hagensborg
Bella Coola
Dean
TWEEDSMUIR PARK
PREHISTORIC & HISTORIC SITES & ROUTES
Obsidian Quarry Sites
Grease Trails
Alexander Mackenzie Trail
Archaeological Sites
(Ref. list in Appendix 9.9)
Historic Sites (Ref. in text)
Dawson's (1876) Route
Dominion Telegraph
Lt. Palmer's Road
SCALE 1:1000 000

potlatch gift. The eulachon grease was carried back over the trails to the interior in cedar boxes.

Eulachon, however, was not the sole reason for the long trek to the coast. The Interior Indians also used the trail when in search of food in bad winters, or to bring furs and skins in trade for oil and sea products. The morning Mackenzie and his men forded the Dean River they met one such Carrier trading party headed for the coast. He describes this party in his journal entry for July 15, 1793:

> "Every man, woman and child carried a proportionate burden, consisting of beaver coating and parchment, as well as skins of otter, the marten and bear, the lynx and dressed moose skins. The last they procured from Rocky Mountain Indians. According to their account, the people of the sea coast prefer them to any other article. Several of their relations and friends, they said, were already gone, as well provided as themselves, to barter with the people of the coast, who barter them in their turn, except the dressed leather, with white people who, as they have been informed, arrive there in large canoes."

Besides oil, furs and skins an important component of trade must have been obsidian. Although the former items of trade leave no trace at source or destination, obsidian persists and has been located by excavation and traced to source by energy dispersive X-ray fluorescence analysis (Carlson, 1984). Obsidian was prized as a cutting edge for implements and weapons, and, since it occurs only rarely, was a valuable trade item. Three obsidian quarry sites are found in or near Tweedsmuir Park; Mackenzie Pass, in the Park, and at the Ilgachuz Mountains and Obsidian Creek near Anahim Creek just east of the Park (Figure 3.A). Obsidian fragments from these quarries have been found on the Queen Charlotte Islands, as far south as the east coast of Vancouver Island, and as far north as the Skeena River, as well as in Alberta. Dating of archaeological sites indicates the presence of Obsidian Creek obsidian at Namu in the 8 to 10 thousand year ago time period, confirming theories of the early occupancy of the Interior plateau following ice melt.

Besides the grease trail followed by Mackenzie, there are at least 3 other noteworthy grease trails a little further north. One originates on the Dean River and crosses the Coast Mountains through Sakumtha Pass to Pondosy Bay on Eutsuk Lake. The second originates on the Kimsquit River and crosses the mountains through Cosgrove Pass at the west end of Eutsuk Lake. A third, known as the "Stick" trail, connects Ulkatcho with the lower Dean River.

Settlements further north were few and have been little investigated. Many settlements and trails were drowned by the raising of the levels of Ootsa and Whitesail Lakes. There has been a long history of encampments at the portage between Chikamin Bay and St. Thomas Bay (Whitesail and Eutsuk Lakes respectively) in the northwest corner of the Park.

The itinerant lifestyle of the Carriers means that there are few archaeological remains from the prehistoric period. In historic times, as a response to changed socio-economic conditions, the Carriers adopted a more settled lifestyle, although they continued to trade and travel. A number of village sites were occupied over long periods. The most important settlement near the Park was Algatcho (Ulkatcho) on the shore of Gatcho Lake (see Figure 3.A). This was an important native trading station and Mackenzie made detailed notes of a conspicuous long house, later photographed by Dawson in 1876, by which time the station had become a proper village. The village was still occupied by 40 or so inhabitants in 1937 when Cliff Kopas and his wife passed through (Kopas, 1976), but fell

out of use in the late 1940's as the three tribes concentrated in the villages of Nazko (Nazko and Kluskus) and Anahim Lake (Ulkatcho tribe).

Appendix 9.9.1 lists trails and archaeological sites identified as affiliated with the Southern Carrier Indians.

3.1.2 Coastal Indian Culture

Coastal Indian cultural heritage is in contrast to that of the Carrier Indians of the interior, since Coastal Indian lifestyles have always been characterized by settlement in permanent villages; a response to the close availability of fuel and food supplies.

The coastal area is occupied by the Bella Coola Indians, although these may well not have been the original inhabitants of the area. Relics of the early period are the Thorsen Creek Petroglyphs (location, Figure 3.A), which are one of the few really large groups of petroglyphs to be found along the northwest coast. There are over 100 designs in a forty by ten meter area. Additional pictographs occur between Hagensborg and Firvale.

The Bella Coolas developed a complex culture in their valley, with a class social structure, strict social observances, verbal literature and art, and considerable buildings. These Indians belonged to the Salishan language family which also occupy the Okanagan and Fraser Delta, but were isolated from them by Carriers and Kwakiutls.

By the 19th century, some two to three thousand Bella Coola Indians lived in up to 40 villages along the Bella Coola and Dean River Valleys and nearby fiords. One well documented village was Nootkleia; Mackenzie named this "Friendly Village" and it was the first one he encountered following his precipitous descent into the Bella Coola Valley down the Burnt Bridge Creek valley. It was still large and inhabited when visited by Lt. Palmer in 1862, but today is overgrown and ravaged by floods from time to time so that only post-holes and mounds remain as surficial evidence. It lies at the western edge of the Park, has great archaeological potential, easy access and lies at the end of the Mackenzie Trail.

In the 1800's there were still many Indian villages along the valley, as far as the head of canoe navigation at Shtooick (Shtooiht) now named Stuie (Figure 3.A), which was an important meeting place between Bella Coola and Interior Indians, and upstream of which there were only seasonal fishing camps. Several sites of archaeological importance remain, though few are documented and excavated; there are, for example, the salmon smokehouse sites at the mouth of the Hotnarko River and at Stuie, the Stuie burial grounds and pictographs 5 kilometers east. The new smokehouse at Stuie indicated the continuing relevance to the Southern Carrier Indians of this historic fishing site.

Contact with European culture in the 19th century onwards led to a swift decline in the actual population numbers and social and economic patterns of the Bella Coola Indians. Imported diseases such as smallpox, to which the Indians had no immunity, decimated the population, and many villages were depopulated. Although banned after the formation of the colony in 1858, the trading of alcohol to the Indian population led to social breakdown and illness. By 1862, Lt. Palmer recorded in his journal that "In moral character the Bella Coolas are degraded species of the red indian ... smallpox has this year contributed a sad quota of death ... numbers were dying each day" (Kershaw, 1981). Palmer found many villages and lodges already deserted and said of this: "To their immoral habits of life, and partly also to wars with the Hydahs, the bloodhounds of the northwest coast, may be attributed the gradually progressing extinction of the race." Today, artifacts have been scattered throughout the museums of the world. The Bella Coola Indian Cultural Centre, craft houses and totem

poles at Bella Coola give the visitor at least a few insights into the sophisticated culture that was developed by this Indian tribe.

The significant archaeological sites affiliated with the Bella Coola Indians, within the Valley and Tweedsmuir Park are listed in Appendix 9.9.2.

3.2 History

Historical records of the Tweedsmuir Park area begin with European exploration of the area, and later settlement, thus ending the prehistoric era. All places referred to in this section are shown on Figure 3.A.

3.2.1 Early Exploration

ALEXANDER MACKENZIE:

It was not until the 1790's that the white man came into contact with the Bella Coola and Carrier Indians. Ocean voyages to Western North America from Europe were initially for exploration, culminating in Capt. Cook's landing in the Queen Charlottes in 1778. The perceived riches to be gained from trade produced a plethora of adventurers afterwards, in search of trade and sovereignty as well as more scientific aims in some cases. Following his circumnavigation of Vancouver Island in 1792, Capt. Vancouver and the 'Discovery' ventured into the coast fiords the next summer, and visited Bella Coola on June 3rd. By coincidence, Alexander Mackenzie reached the same village only seven weeks later; overland, from the opposite direction!

Alexander Mackenzie's epic journey, the first overland crossing of the continent, was brought about by a combination of circumstances. Active competition between the Hudson's Bay Co. and North-West Co. extended fur trade areas ever further west, with new trade areas to be claimed for the Company and home country. Resultant extended trade route costs required the immediate discovery of the reputed North-West Passage, if it existed, to keep expenses and effort down. In addition, the spirit of adventure was obviously strong in the explorers who tackled the unknown at great personal risk and hardship. Mackenzie's travels began at Fort Chipewyan in 1789, from whence he traced the soon-to-be-named Mackenzie River to its mouth in the Arctic Ocean, a 5000 kilometer journey which failed to uncover the North-West Passage he sought.

He returned from England with additional navigational skills, to attempt a crossing of the mountains in 1793. His route was westward upstream on the Peace River, through the Rockies in the gap now occupied by Williston Lake, then south to the headwaters of the Parsnip River in the Rocky Mountain Trench. His route continued over the portage into the McGregor River and thence the upper Fraser River which Mackenzie assumed must be the Columbia River, the mouth of which had been discovered the previous year; yet he was puzzled why the Fraser was so far north, and showing little directional inclination towards its supposed mouth some 8 degrees of latitude further south. Finally, he reached a stalemate north of Williams Lake where rapids on the Fraser blocked his path (approximately at Fort Alexandria).

Here in Carrier Indian country Mackenzie accepted the advice of local inhabitants to "walk west overland along a river to the great stinking lake (the Pacific)". They talked of hostile tribes and difficult rapids to the south; moreover, Mackenzie knew that this "Columbia" river came to the coast too far south to be a useful trade route. His observations and thoughts are recorded in his book entitled 'Voyages From Montreal on the River St. Laurence Through the Continent of North America to the Frozen and Pacific Oceans in the Years 1789 & 1793'. On the decision to head west

from the Quesnel area he writes:

> "They assured us that the road was not difficult as they avoided the mountains, keeping on the low land between them, many parts of which are entirely free from wood. According to their account, this way is so often travelled by them, that their path is visible throughout the whole journey, which lies along small lakes and rivers. It occupies them, they said, no more than six nights, to get where they meet the people who barter." (Lamb,1970).

On July 4, Mackenzie and his part cached their canoes on the banks of the Fraser River and began their trek to the Pacific. Carrying large packs each, rising before 5 a.m., eating only 2 meals a day, and travelling an average of 13 miles a day, Mackenzie and his men reached "Friendly Village" on the Bella Coola River in 14 days. His route was more or less westward all the way. He followed the contorted West Road (locally Blackwater) River, thence the Euchiniko River to Titetown Lake and again the West Road River by the chain of lakes culminating in Eliguk Lake. From there the trail continues west to Gatcho Lake, where the Carriers had their main trading station at Ulkatcho, just east of the Park boundary. Mackenzie in particular noted the potlatch house there. The trail turns southwest to cross the Dean River at lot 679, past Squiness Lake to the Tanya Lakes where Dorsey's hunting log cabin is now located, avoiding the rugged Rainbow Range to the south. Beyond Tanya Lakes the trail climbs the Mackenzie Valley to Rainbow Cabin (Walker's cabin), thence southwest via Mackenzie Pass, or near to it, to Fish Lake and a steep descent down the Burnt Bridge Creek valley, at the edge of the Park, to the "Friendly Village" in the Bella Coola Valley. Mackenzie had the advantage of having not only a well-travelled route to follow but also Indian guides.

From Friendly Village, Bella Coola Indians paddled Mackenzie's party down river to the sea. Determined to get an accurate reading of his position, the explorer canoed a further 60 kilometers out into the Dean Channel, looking for open sea. At one point, menacing Indians forced Mackenzie to take refuge on a defensible promontory at the entrance to Elcho Harbor where he:

> '... mixed up some vermilion in melted grease and inscribed in large characters, on the southeast face of the rock on which we had slept last night, this brief memorial - Alexander Mackenzie, from Canada, by land, the twenty-second of July, one thousand, seven hundred and ninety-three." (Lamb, 1970)

A National Historic Sites monument marks the spot today, and the words have been engraved into the rock. The site is known as Sir Alexander Mackenzie Park. (see Figure 3.A).

In recent years Mackenzie's route has received considerable attention, and is being developed as the Alexander Mackenzie Heritage Trail by the Canada - B.C. Agreement for Recreation & Conservation, so that more information on the trail and sites along the way is constantly coming to light. The western sections of Mackenzie's trail are shown in Figure 3.A.

The results of Mackenzie's exploration and discoveries were significant for British Columbia, and led to the surveys of Simon Fraser and Thompson, strengthening the British presence on the northwest coast. Mackenzie's published notes on Indian culture and the natural environment became the first recorded history of the Interior, and a benchmark for comparison with the future. Lifestyles of the Indians were to change rapidly as they became involved in the fur trade and had contact with Europeans.

EARLY 1800'S:

The Central Coast Indian villages saw little contact with white men following the initial contacts of the 1790's. Gradually, the Hudson's Bay Co. had established control over the fur trade, and ruled its New Caledonia territory from Victoria, with a few trading posts at coastal villages. By 1858 only about 200 white people are estimated to have lived in the present-day British Columbia mainland. The Bella Coola valley saw occasional visits of fur traders by sea, such as John Dunn's visits with the famous steamship, the 'Beaver'; the Indians thus had access to more iron goods and cloth. Eulachon grease, furs, dried salmon and berries were traded in return. Otherwise, furs could be traded at the nearest Bay post of Fort Alexandria on the Fraser River, using the Grease Trails.

LIEUTENANT PALMER:

The Fraser River Gold Rush of 1858 occasioned the establishment of the colony of British Columbia, and the building of a dangerous road via Harrison Lake to the goldfields from the lower mainland. Mining interest quickly shifted further north to the Cariboo District; for the 3,000 miners involved this meant a long journey and costly supplies. Construction of the Cariboo Wagon Road in the Fraser Canyon began in 1862 from Yale, the limit of Fraser navigation, but other routes were sought, to reduce the distance. Attention turned to the heads of the indented fiords, which penetrate well inland of the coast, such as Bute Inlet and Bentinck Arm. Companies were granted charters to construct toll roads from the coast, and soon all that remained was the survey of a suitable route.

The Royal Engineers, under Col. Moody as Chief Commissioner of Lands & Works, were responsible for mapping, and road construction. Accordingly, in the summer of 1862, Lt. Palmer R.E. was chosen to carry out an extensive survey of the Cariboo District and at the same time examine and report on the proposed Bentinck Arm road. An eight-page memorandum from Moody described Palmer's assignment. He was to "proceed by the first opportunity to N.B. Arm" and after laying out a townsite, an Indian Reserve and mapping the location and occupancy of all buildings, to travel as soon as possible "along the proposed road to the junction of the Swift River and the Fraser - altering the line as he may think proper and approving in general terms as he proceeds".

Palmer's examination of the route immediately disclosed a number of shortcomings. While he declared construction of a wagon road to be perfectly feasible, the want of a good anchorage at Bella Coola and the absence of good soil and pasturage along the way led him to conclude that the route was "unlikely, for the present at least, to acquire importance as an arterial highway to the established gold mines of this country". Palmer's report contained detailed descriptions that have made a significant contribution to knowledge of the region, and was widely sought after. His maps were remarkably accurate, and used for the next 50 years.

Palmer's cautionary report was sufficient to cause the construction charter company to abandon the project. Palmer's rough-cleared route was, however, used for many years by settlers, miners and traders as a pack trail; the western end continued to provide the principal overland access to the Bella Coola valley until the Highway was completed in 1952. His route is shown on Figure 3.A.

Palmer's journal is reprinted, with commentary, in Kershaw, 1976, while his journey is recounted, with fictional narrative, in Kopas, 1970.

DR. GEORGE DAWSON:

When British Columbia joined Canada in confederation, it was agreed that the Geological Survey of Canada would explore the province and report

on geological matters along with topographic surveying and mapping. Hence, in 1875-6 "Dr. George" Dawson arrived to study the Central Interior. Fortunately for historians, Dawson was not only accomplished in geological matters, but interested in biology, anthropology and sociology. He was held in high esteem by colleagues and had the knack of interpreting overviews from samples. Following an 1875 circuit expedition through the Nazko and Chilcotin areas, Dawson spent the summer of 1876 surveying the Nechako Plateau. As Figure 3.A shows, his route followed the Mackenzie Trail from Quesnel to Ulkatcho, from where he turned south to inspect the Rainbow Range before proceeding northward through the present day remote regions of the Park across the Dean River, Sigutlat Lake and to Eutsuk Lake, before returning along the Nechako to Fort George. From his observations on this and other trips he published papers on glacial geology. Theories on the glacial history of the area that he proposed are still accepted today, as well as his identification of the importance of the shield volcanoes to the area's geological evolution. Moreover, his careful notes on the people and settlements that he encountered, and in particular the photographs that his expedition took, are invaluable records of the time period. Results were published in the Geological Survey of Canada's annual "Reports of Progress".

TRADE, RAILWAYS & RELIGION:

In 1867, in the midst of much unrest and poor relations with Indian communities, the Hudson's Bay Co. established a trading post ashore at Bella Coola, to supplement the frequent visits by its ships. The Company helped establish order, and relations with the Bella Coolas were good. Their post remained until 1882, when it was sold into individual ownership.

The 1870's saw significant pressure to construct the first transcontinental railway. No obviously superior route was known, yet the union of B.C. into Canada had been made on the promise of a railway. Thus, by 1874 there were 7 survey parties comprising 300 men examining all possible routeways north of 49 degrees latitude. (Kopas, 1970). In 1873, Horetzky explored and recommended the route from Bentinck Arm through the Bella Coola gap to Giscombe Portage, thence by Fort McLeod and the Peace River. The next year an exploratory survey was made from the head of Dean Channel on the Dean River to connect with other routes in the Blackwater River Valley. In 1876, harbour possibilities were inspected in the Dean Channel. In the end, of course, the route followed the Fraser Canyon to Burrard Inlet, and Bella Coola remained a backwater.

The 1880's saw the attention of several churches turned towards the Indians, reduced in numbers by smallpox and alcohol. There were many missionary visits, and in 1883 a mission was established at Bella Coola by the Methodist Church (Kopas, 1970). Little is known of their early efforts. Further north, Father Morice, an Oblate priest, travelled through the North Central area of B.C., surveying the land and producing relatively accurate maps and documentary accounts of the region.

3.2.2 White Settlement

By the early 1880's serious permanent settlement by a white population began in the Bella Coola Valley, and a little later in the Plateau regions.

NORWEGIAN SETTLEMENT:

In 1885, the apparently innocuous journeys of Philip Jacobsen, a Norwegian, from Victoria to Alaska, visiting all the coastal Indian settlements and collecting curios and artifacts for museums in Germany, were to become important. His visits are well documented in Kopas, 1970. Soon after, he settled in British Columbia and became enthused with the

idea of the Bella Coola valley as a possible site for settlement. He promoted the idea, and financed an initial survey of the land in 1892, which was completed by the government the next year. Bella Coola had been gradually developing as a supply point, in any event, for the new ranchers moving into the Plateau regions, whose supply alternative was in crossing the Fraser to Ashcroft; gradually, permanent white settlers arrived, till there were 16 in Bella Coola by 1894.

Many Norwegian settlers who had migrated to Minnesota were severely hit by the depression of 1893, and tired of the climate and scenery so different to their homeland. As excellently documented in Fish, 1982, leading one search for a better area was Rev. Christian Saugstad, pastor of the Lutheran Free Church in Polk County, Minn. Philip Jacobsen had taken to writing articles in Norwegian language newspapers and magazines, extolling the virtues of the Bella Coola Valley and its similarity to the Norwegian fiords. Saugstad thus visited the area to assess the possibilities for a colony. He was suitably impressed, began signing up colonists and negotiated a land grant from the B.C. Government on condition that any land granted would be improved, that colonists would have money upon arrival, and that a road would be built. The colonists were well received by the government and media of the day. The colonists scattered along the valley, but centred around a point about 20 kilometers inland; the community became known as Hagensborg, the location of Hagen Christensen's store. Although not all arrivals stayed, the colony had 158 members by 1896 and the infrastructure of a fully-fledged community was gradually constructed. Fishing and hunting supplemented farming income.

The settlement was a success and attracted other settlers. There are still many descendants of the colonists in the present Valley population of 2,000 people. A few old buildings remain from the early years, especially in Hagensborg. One of the early colonists, Jake Lunaas, moved over the mountains in the early 1900's and refurbished Lt. Palmer's route out of the valley (Suthill,1970). The small communities like Firvale (originally Sloan) were begun by families such as the Hobers, and were later populated by Seventh Day Adventists, among others. The Norwegian imprint on the valley, also reflected in the names of many natural features, has therefore been strong.

20TH CENTURY SETTLEMENT OF THE UPPER VALLEY:

As the Bella Coola Valley and Plateau areas became gradually more accessible and 'civilized' in the early 20th century, settlement began at a steady pace in the upper Bella Coola Valley (Atnarko River, etc.) and on the high plateau areas further east.

The settlement of the valley within the Park is partly described in Kuch (1982), and seems to have been the preserve of bachelor "loners". Atnarko began as a preemption by two bachelors, Dale and Marvin, who planned to develop a combination horse ranch and sporting lodge. The three Ratcliff brothers from Oregon established adjoining claims 8 miles further upstream. Cresswell from England occupied what is now the Park campsite, and in 1911 Mosher, another American, preempted land at Mosher Creek where a post office, telegraph key and telephone were installed; the original Atnarko.

The best-known settler in the valley is Ralph Edwards, who arrived in 1912 from the U.S. with a fierce desire to find free land and create a farm. Unlike other settlers, however, he had a vision of settling "on a lake with mountains all around" but beyond the furthest outpost of settlement in the valley. His life story has been told in the popular novel "Crusoe of Lonesome Lake" by Leland Stowe, and in "Ralph Edwards of Lonesome Lake" by Ed Gould. Edwards travelled immediately upon arrival to

the furthest settlement beyond Atnarko, and with the help of Frank Ratcliff found his ideal site the same year. The homesite was later named 'The Birches' and the lake became Lonesome Lake. Through incredible efforts, and despite loneliness and inexperience, Edwards cleared much land of the massive cedars and fir, building his first cabin in 2 years and gaining funds from outside road and telegraph line work. Eventually, 'The Birches' was enlarged to become a sizeable farm. Ralph Edwards married and raised a family there, and originated the feeding of the trumpeter swans that overwinter at Lonesome Lake. Although Ralph has now died, his sons and daughters still live in the area: John Edwards operated the Turner Wilderness Camp at nearby Turner Lake.

In the 1930's, Tommy Walker established Stuie Lodge at Stuie, the historic meeting place of Indian Tribes. The lodge was the forerunner of Tweedsmuir Wilderness Centre which operates today. Around the same time, log cabins, for the use of hunting parties were constructed by Walker (Rainbow Cabin), and by Lester Dorsey on Tanya Lakes.

VALLEY LINKS WITH THE OUTSIDE WORLD:

Apart from boat connections, the first significant link between the Bella Coola Valley and the outside world was the establishment of telegraph and telephone communications. Around 1901 or 1902 a local telephone network had been established, extending about 40 kilometers up the Valley to Canoe Crossing. Around 1915 the Dominion Government Telegraph Line was established between Bella Coola and Clinton, more or less following Lt. Palmer's route via the Hotnarko River. This system did not connect with the local telephone system until 1941-2 when the telegraph line was upgraded to permit voice communication. The line is still used within the Valley as far as Park headquarters. The line over the mountains has been abandoned in favour of a long-distance microwave system installed in the 1950's (Suthill, 1977). The telegraph posts are extant although the downed wires tend to make passage difficult along nearby rough trails.

The community of Bella Coola itself grew gradually as a supply port for pack trains to the Interior and Valley settlers. Missionaries returned and eventually fish canneries were built in 1896-7, which continue in production. Bella Coola came close to becoming the terminus of the Grand Trunk Pacific Railway in 1914, as the village was one of several proposed termini. The eventual choice of Prince Rupert ruined many plans and speculations, and ensured that population growth would remain slow and the rural lifestyle would be maintained.

The most significant event for the Valley has been completion of the Heckman Pass motor road (Highway 20) linking Bella Coola to Anahim Lake, and to the provincial highway network and B.C. Railway at Williams Lake. Prior to this, the wagon road from Bella Coola was gradually extended up the valley by the Norwegian settlers and then beyond that by the upper valley residents, to Mosher Creek. Further on, pack trains followed the valley trails and Palmer's route to the Interior. Work on the new road was done over many years entirely on local initiative, with funding from a series of small government grants, usually after the fact. The 80 kilometer road cost around $62,000 and was completed by 1953. It is a tribute to local resourcefulness and determination, ensures a reliable supply system from outside, and enables tourists to visit the area and supplement the local economy.

20TH CENTURY SETTLEMENT OF THE UPPER CHILCOTIN (East of Park)

In the early 20th century, Bella Coola played a significant role as the trans-shipment port for supplies from Vancouver, destined to travel by pack mule over Lt. Palmer's road to the new settlers gradually moving to

the Fraser Plateau (Chilcotin) area and setting up ranches. When the B.C. Railway reached Williams Lake in 1919 and a bridge crossed the Fraser at last, settlement began in earnest, based on Williams Lake as the supply point. By the 1930's the road from Williams lake was passable to Anahim Lake and connections to the coast became less important.

The best documented example of settlement on the Plateaus is that of the Home Ranch (Figure 3.A for location). This ranch is north of Anahim lake and connected to it by a wagon road between the Ilgatchuz and Itcha shield volcanoes, and also lies adjacent to the Mackenzie Heritage (Grease) Trail. In the early part of this century, Americans Pan Phillips and Richard Hobson rode into this Upper Blackwater (West Road River) area in search of new ranching frontiers, and established the Home Ranch on natural hay meadows. Their cattle were driven to market along the Grease Trail to Quesnel or to Vanderhoof. Hobson, through his books "Grass Beyond the Mountains" and "The Rancher Takes a Wife" has made Pan Phillips and the Home Ranch part of B.C. folklore. Phillips, until recently, operated a hunting and fishing camp nearby. The Home Ranch has now been deserted, but the buildings, including the original sod roof log house, a large lodge, cabin and barns remain intact if deteriorating.

A small group of Indian and white families still live the pioneer-style life in the Upper Blackwater, supported by ranching, hay meadows, fish camps, guiding and trapping. Indian settlements have tended to centralize in the communities of Nazko and Anahim Lake.

SETTLEMENT OF THE OOTSA LAKE AREA (North of Park)

The Ootsa Lake area at the northern fringe of Tweedsmuir Park was first surveyed by H. J. Cambie, a government surveyor looking for CPR routes, in 1876. He chose the name 'Ootsa' from the Indian word meaning "down towards the waters".

An aggressive government promotional advertising scheme, construction of the cross-Canada Telegraph Trail, and later the Grand Trunk Pacific Railway from Edmonton to Prince Rupert lured settlers into B.C.'s "Lakes District" area which includes Ootsa Lake and also Francois Lake and the Upper Nechako Valley further north. The first known settlers were three men who hiked from the then Indian village of Kemano over the Coast Range and via Tahtsa Lake to register a land claim alongside Ootsa Lake in 1904 (Shelford, 1975).

Pioneer men arrived gradually from 1905 onwards, with the first families arriving after 1909. Arthur Shelford, who arrived in 1908 and farmed near Ootsa Lake until 1966, gives an excellent account of early conditions and growth of the area in the 'Pioneer Days In B.C.' publication (Shelford, 1975). At first, access to the area was difficult and comprised of either a stern-wheeler up the Skeena River to Hazelton and thence a long hike, or an even longer pack horse train trip along grease and pioneer trails from Bella Coola. Completion of the Grand Trunk Pacific Railway in 1914 made communications a little easier, and settlement of the Lakes District began in earnest. Most people made a living from hay and cattle, hunting, trapping and fishing: settlers arrived from diverse sources such as Ireland, the U.S., England and Newfoundland. Communities on Ootsa Lake such as Ootsa Landing, Wistaria and Streatham (named after the first settlers' London suburb birthplace) developed infrastructure and roads over the years. Completion of the government's Portage Railway linking Whitesail and Eutsuk Lakes in 1929 increased the utility of the lake routes in the region.

in the early 1950's settlement patterns were totally disrupted when, as part of a hydroelectric scheme, the levels of Ootsa and neighbouring lakes were raised some 50 meters. The higher lakeshores were rendered

useless by flooded tree stumps, and 79 farms and homesteads on the former lakeshore were submerged forever.

The history of the Ootsa Lake settlements, and of the entire Lakes District, is well recorded in 'Burns Lake & District' by P. Turkiis and the Burns Lake Historical Society.

4.0 VISUAL RESOURCES

Sightseeing is the single most important motive cited by visitors to Northern B.C. (see Section 7.3.1). The visual resources of the Park are thus particularly significant, and with its great range of regional landscapes, physiographic changes and vegetation types, the Park has much to offer. Five examples are presented below:

LINDQUIST LAKE & CHIKAMIN RANGE (Southwest of Whitesail Lake)

Physiographic Region / Regional Landscape: Kitimat Ranges / Bulkley-Morice Rolling Mountains.

This spring view shows well the bleak nature of the area, with lots of bare rock, steep slopes dropping straight into the glacial lake, and sparce vegetation which quickly grades from Coast hemlock by the lake, to mountain hemlock & fir to high altitude parkland and tundra.

The Chikamin Range is typical of the Kitimat & Bulkley-Morice Ranges, with small snowfields on north-facing slopes, and a steep but not rugged or intensely dissected terrain compared to the Pacific Ranges (see below); a result of lower altitudes up to 1900 meters.

EUTSUK LAKE (East end) looking west

Physiographic Region / Regional Landscape: Nechako Plateau.

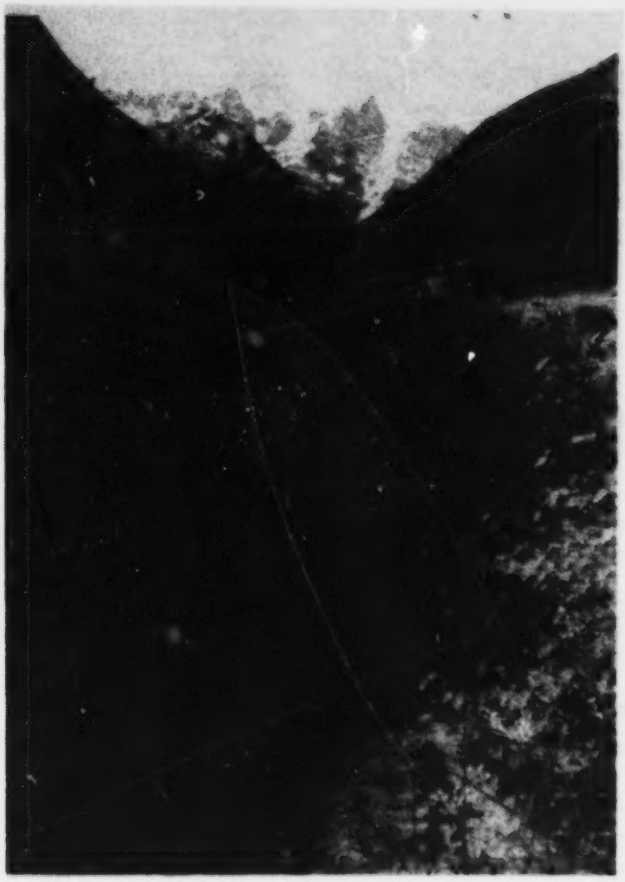
This area provides a perfect example of the extensive Nechako Plateau scenery, with the gently rolling plateau, interrupted by remnants of erosion-resistant mountains (as in the centre of the photograph), blanketed by thick forests of fir, spruce & pine, bisected by Eutsuk Lake in a shallow trough aligned in the west to east direction of the movement of sheet glaciation which once engulfed the area. Typically, the extensive Plateau ends abruptly at the outer ranges of the Coast Mountains in the distance, Mt. Preston in the centre and the Pattullo Range to the left, some 50 kilometers away. The Nechako Plateau epitomized the 'endless rolling plateau blanketed in trees and ending in snowy mountains' vision that many foreigners have of a typically Canadian landscape.

RAINBOW RANGE (Beef Trail Creek headwaters)

Physiographic Region: Rainbow Range.

Regional Landscape: Western Interior Shield Volcanoes.

This characteristic scene shows the special & unusual appeal of the Rainbows, where high, gentle-sloping shield volcanoes have been eroded by glaciation and dissected by streams to produce a landscape of great beauty. Gentle slopes covered with alpine meadows and flowers in summer alternate with scree slopes & bare rock coloured by an astonishing spectrum of reds, oranges, yellows & lavenders - it is no coincidence that the highest point, Tsitsutl Peak, means 'painted mountain' in the local native dialect. The landscape is reminiscent of the dissected cones of Hawaii, but its unique vegetation makes this an unrepeatable viewing area that is easy to traverse.



ATNARKO VALLEY (looking west)

Physiographic Region: Pacific Ranges / Fraser Plateau.

Regional Landscape: Rugged Pacific Ranges.

The Atnarko Valley is a classic example of the U-shaped glaciated valley, and possesses all the features produced when a massive valley glacier deepens its valley: very steep sides and a flat valley floor; alpine meadows (benches) high up on the valley sides demonstrating the maximum height of the main valley glacier; a relatively straight course and truncated spurs as obstacle ridges of tributary valleys were swept away, and "hanging" tributary valleys whose own smaller glaciers could not deepen their valleys as low as the main valley. Forested scree (debris) and moraine (glacial deposition) features occupy the lowest valley-side slopes and parts of the valley floor. The Pacific Ranges in the distance typify the higher (2500 meters+) and more rugged mountains than the Kitimat Ranges further north. This scene epitomizes the 'Swiss Alpine' look beloved by hikers and photographers worldwide.

MONARCH MOUNTAIN / CONCUBINE PEAKS / TALCHAKO GLACIER

Physiographic Region / Regional Landscape: Pacific Ranges.

This area over 3500 meters high shows the highest mountain in the Park, part of the massive Monarch Icefield and the Talchako Glacier heading downslope towards the bottom left. With its ice-shattered peaks, icefields, bare rock ridges & monotone brown and white, this landscape demands adjectives like 'spectacular', 'awesome', 'barren' and 'rugged' rather than 'beautiful' or 'pretty'. It represents the ultimate in high-altitude scenery and is primeval in nature since it shows no evidence of the existence of man nor vegetation; as such it could equally well be a scene in the Himalayas, high Andes or Antarctica.

5.0 LAND TENURES, OCCUPANCY RIGHTS & JURISDICTIONS

Although Tweedsmuir has long been established as a provincial park, various claims and rights for private activities exist within park boundaries. In some cases, such rights existed before the park was established, and have been permitted to continue, while other activities have been deemed suitable to take place within the Park setting. The following sections of this chapter describe these claims and activities in detail.

5.1 Mineralization

The Tweedsmuir area has a lengthy history of mineral exploration, and limited development. From the early 1900's there has been frontier exploration in the northern Park area, and in 1914 placer and vein gold deposits were identified just northeast of the present park boundaries: however, with primitive mapping and difficult access, development did not proceed. In 1943, gold, silver and lead were discovered at Lindquist Lake in the northwest corner of the Park, and there was much exploration and some successful discoveries of similar minerals in the Troitsa & Tahtsa Lakes areas, and of molybdenum in the Berg area north of Whitesail Lake. Mineral claims were staked on all mineral areas. Exploration and testing continued in the Park, under Park Use Permits, until the 1970's. A mineral and placer reserve had, however, been placed in 1960 (Order-In-Council (O.I.C.) #396, see Appendix 9.1) on the shorelines of Ootsa, Whitesail and Eutsuk Lakes and their adjacent lakes.

5.1.1 Existing Claims

Many mineral claims were staked within the Park up to 1973. In 1973 O.I.C. #1442 rescinded previous O.I.C.'s #2055 & #659 that had permitted mineral prospecting and claims within larger and less well-used Class A & B Parks; exploration and development of existing mineral claims in such parks were henceforth prohibited, unless permitted by Park Use Permit. (See Appendix 9.1 for O.I.C.'s). Various Crown Grant claims were allowed to lapse by claim holders. At present 168 valid mineral claims exist wholly or partly within the Park, belonging to 4 registered mining companies and 2 individuals. The claim areas are shown on Figure 5.A and claims are summarized in Appendix 9.10.

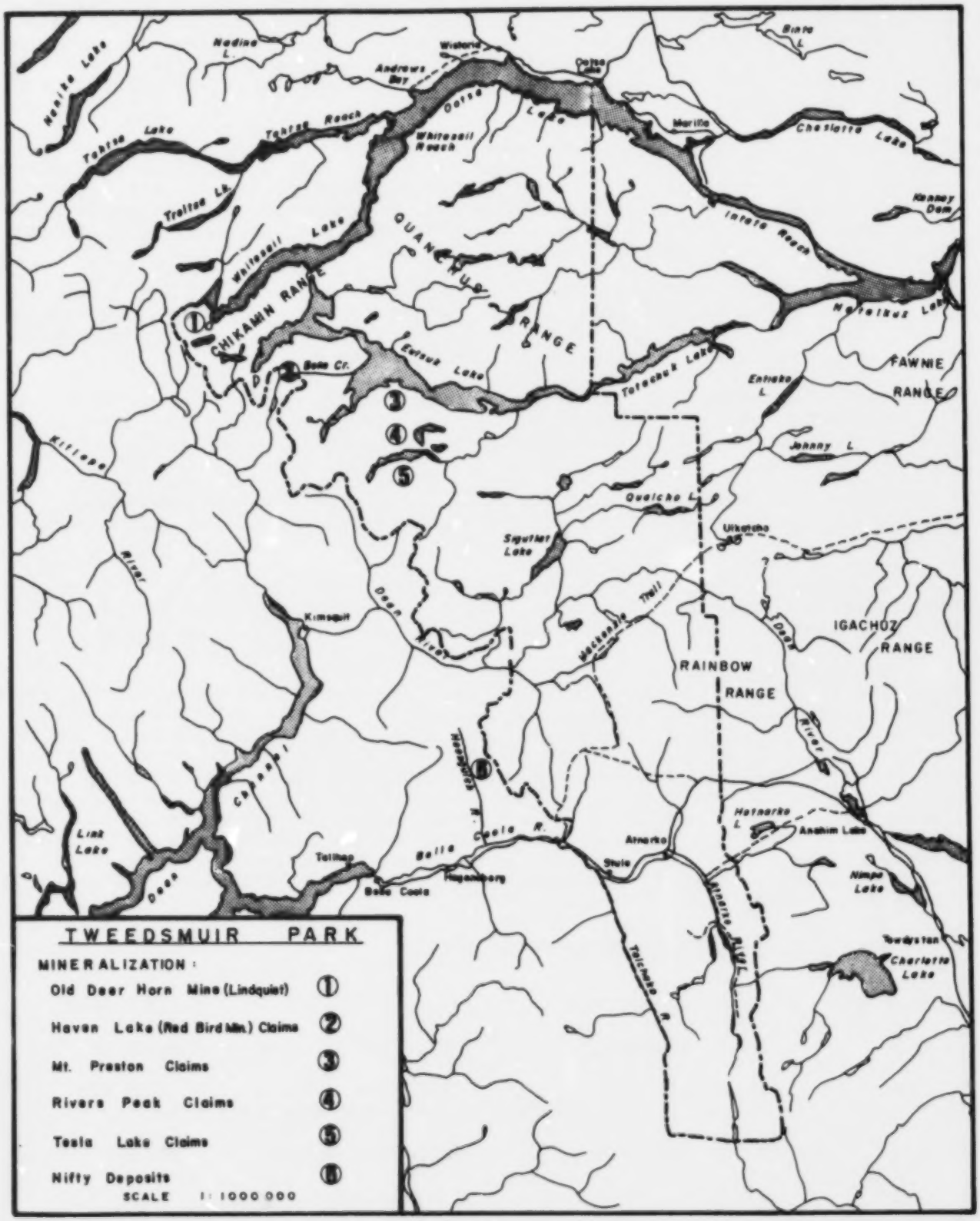
5.1.2 Mineral Potential Areas (See Figure 5.A)

Several areas in the northern part of the Park have mineral deposits. Some have been explored and partly developed, others only roughly mapped or 'gopher' mined. In most cases a lack of accurate modern technology mapping impedes exact knowledge of mineralization and potential. The known major areas are detailed below:

NIFTY DEPOSITS: These Deposits of silver, lead, zinc and barium have been only recently confirmed and lie astride the Park boundary east of Noosgulch River. Deposits are rated as having good to excellent potential and are part of the Gambier Group of Hazelton Volcanics which occur on the west side of the Talchako Valley and are thought to have common occurrence with the Brittania Beach (Squamish area) deposits and those a little further north at Tesla Lake (Meteor claim). There has been no development, and mapping is considered inadequate at present.

RED BIRD MTN. (HAVEN LAKE) DEPOSITS: These molybdenum and possibly silver and gold deposits were discovered in the 1960's. Extent of deposits is considered significant and, prior to the moratorium, access to the area was

FIGURE 5.A


Nadina Lake
Nadina L.
Andrews Bay
Wistaria
Palte Lake
Biste L.
Tahtsa Lake
Tahtsa Reach
Ootsa Lake
Whitesail Reach
Morice
Chelaslie Lake
Kenney Dam
Trailer Lk.
Whitesail Lake
QUANCHUS RANGE
CHIKAMIN RANGE
Intata Reach
Natalkuz Lake
Bobs Cr.
Eutsuk Lake
Tatuchas Lake
FAWNIE RANGE
Entsako L.
Johnny L.
Kirilaps
Quaicho Lake
Ulkatcho
Sigutlat Lake
River
Kimsquit
Dean River
Dean
Mackenzie Trail
IGACHOZ RANGE
RAINBOW RANGE
Lind Lake
Tatlayoko
Bella Coola R.
Atnarko
Stuie
Hotnarko L.
Anahim Lake
Nimpo Lake
Tweedsmuir
Charlotte Lake
Tatlayoko R.
Bella Coola
Hagensborg
Dean
TWEEDSMUIR PARK
MINERALIZATION :
Old Deer Horn Mine (Lindquist) 1
Haven Lake (Red Bird Mtn.) Claims 2
Mt. Preston Claims 3
Rivers Peak Claims 4
Tesla Lake Claims 5
Nifty Deposits 6
SCALE 1: 1000 000

gained via a 15 kilometer road from Eutsuk Lake along Bone Creek Valley, where an airstrip was also constructed. The actual deposits lie just outside the Park, but, economically, the only possible access is through the Park. Initial surveys indicated underground and surficial mining deposits, and since no mapping has been done since 1972, all surveys are considered obsolete.

DEERHORN (LINDQUIST): Lying just inside the Park's western boundary, these deposits of gold, silver and possibly tungsten were accessed by a mining road from Whitesail Lake via Lindquist Lake. With proven deposits of 1/4 million tonnes, some initial development of an underground and surface mine were completed by Deerhorn Mines Ltd. prior to 1973. The crown grants have since been allowed to lapse, and have reverted to the Province.

MOUNT PRESTON / RIVERS PEAK (N.): This is an area of small but numerous deposits of copper and possibly silver and/or gold, just south of Eutsuk lake. Four of the claim blocks occur here. Mineralization is considered good, but very little modern exploration has been done.

CHIKAMIN RANGE: These deposits are numerous small discoveries within the Chikamin Range between Whitesail and Eutsuk Lakes. Silver, gold, lead and zinc have been located by speculative 'gopher' mining, with little serious exploration.

Locations of the claim blocks and above mineral areas are shown on Figure 5.A, except for the scattered mineralization areas in the Chikamin Range.

Information for this section was derived mainly by personal communication from Dr. Faulkner, District Geologist, B.C. Ministry of Energy, Mines & Petroleum Resources, Prince George.

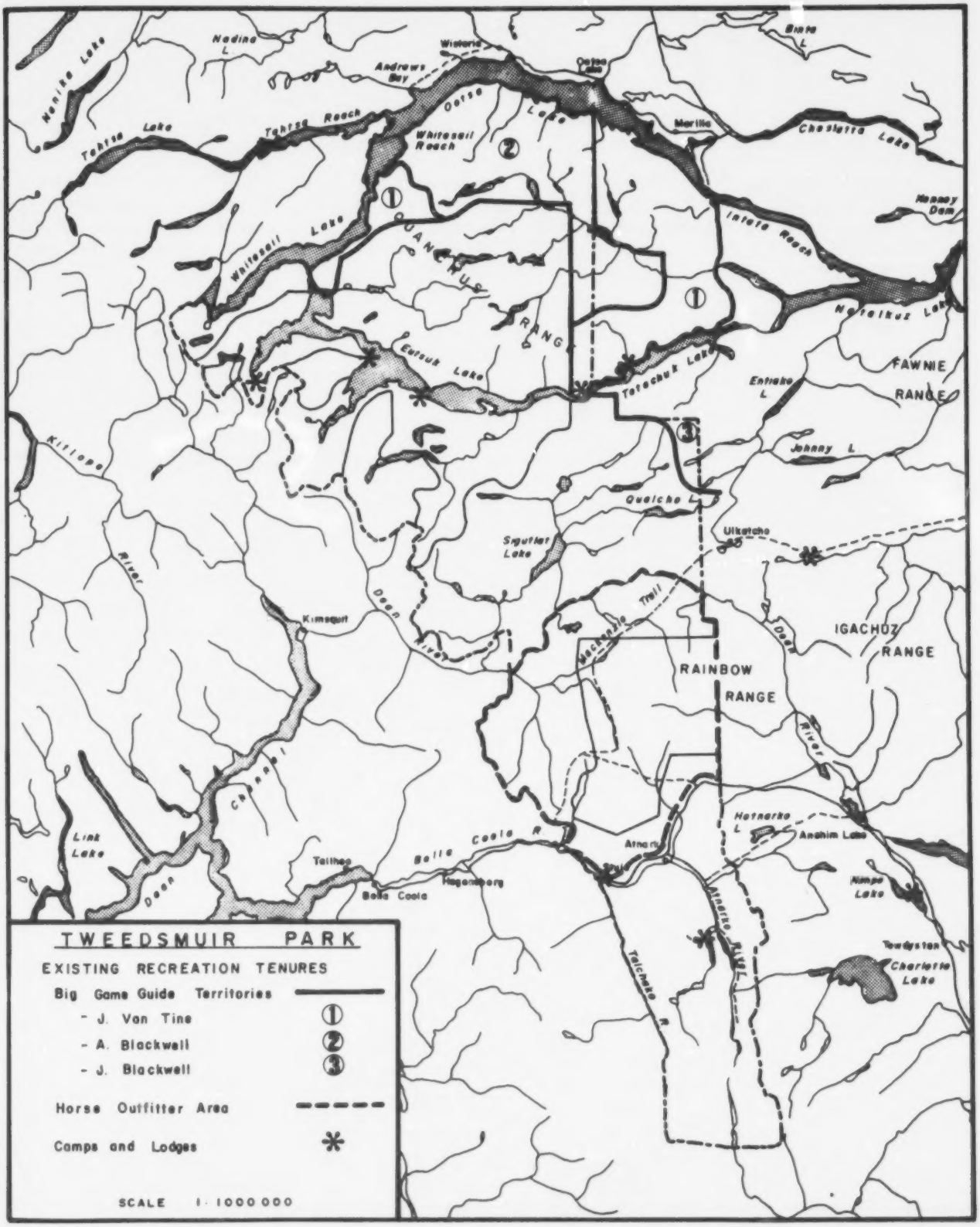
5.2 Big Game Guide & Packer Territories

The Permittees listed below hold Park Use Permits to guide hunters and horse riders into certain areas of the Park. Permittee's names, permit numbers & expiry dates, & purpose of permit are listed below. Areas covered by the permits are shown on Figure 5.B, which also shows some of the private lodges and camps operated within & near the Park for the accommodation of Park visitors. Apart from Lodges operated along Highway 20 for the benefit of both tour groups & incidental travellers, the remainder are camps or cabins operated in remote locations without road access: those within the Park are operated by permit holders as fishing & hunting camps. There are numerous small camps & cabins in the Park besides those shown on the map.

Big Game Guides & Packers (June, 1986)

Park Use Permit #	Guide (Permittee)	Type of Permit	Expiry Date
553	A. E. Blackwell	Big Game Guiding	31.3.87
562	R. Williams (permit is non-renewable: not mapped on Fig. 5.B)	Big Game Guiding	31.3.87
565	J. M. Van Tine	Big Game Guiding	31.3.87

FIGURE 5.B


Nadina L.
Andrews Bay
Tahtsa Lake
Tahtsa Reach
Whitesail Reach
Whitesail Lake
Morice Lake
Owen Lake
Morrison L.
Morrice
Chelaslie Lake
Nanny Dam
Intata Reach
Nechakuz Lake
Eutsuk Lake
Tetachuk Lake
Entsako L.
Johnny L.
Quaicho L.
Ulkatcho
Sigutlat Lake
Kimsquit
Dean River
Mackenzie Trail
RAINBOW RANGE
IGACHUZ RANGE
FAWNE RANGE
Kitlope River
Chanati
Link Lake
Talbo
Bella Coola R.
Hagensborg
Bella Coola
Atnarko
Hotnarko L.
Anahim Lake
Kimsquit Lake
Tsoodyston
Charlotte Lake
Telchaco R.
TWEEDSMUIR PARK
EXISTING RECREATION TENURES
Big Game Guide Territories
- J. Van Tine
- A. Blackwell
- J. Blackwell
Horse Outfitter Area
Camps and Lodges
SCALE 1:1000000

1120	J. Blackwell	Big Game Guiding	n/a
1600	Tweedsmuir Horse Guiding	Concession	31.1.91

(Dorsey: horse outfitter-packer)

5.3 Traplines

At present the Park includes 21 registered private traplines. These traplines are mapped on Figure 5.C and listed in detail in Appendix 9.11.

5.4 Inholdings

At present 28 parcels of land within the Park are held in fee simple ownership. The locations of these private lands are shown on Figure 5.D. A detailed listing of legal descriptions, owner names and parcel sizes is included as Appendix 9.12, cross-referenced to Figure 5.D.

5.5 Park Use Permits

As of June, 1986, 40 Park Use Permits, issued by the Ministry of Environment and Parks, are held within the Park. They allow the permittees to conduct various activities, such as big-game & commercial guiding, trapping, or to maintain structures such as fishing camps and spawning platforms, which would otherwise not be allowed in the Park, and are reviewed and renewed at regular intervals.

A complete list of current permits and their details is presented as Appendix 9.13.

FIGURE 5.C

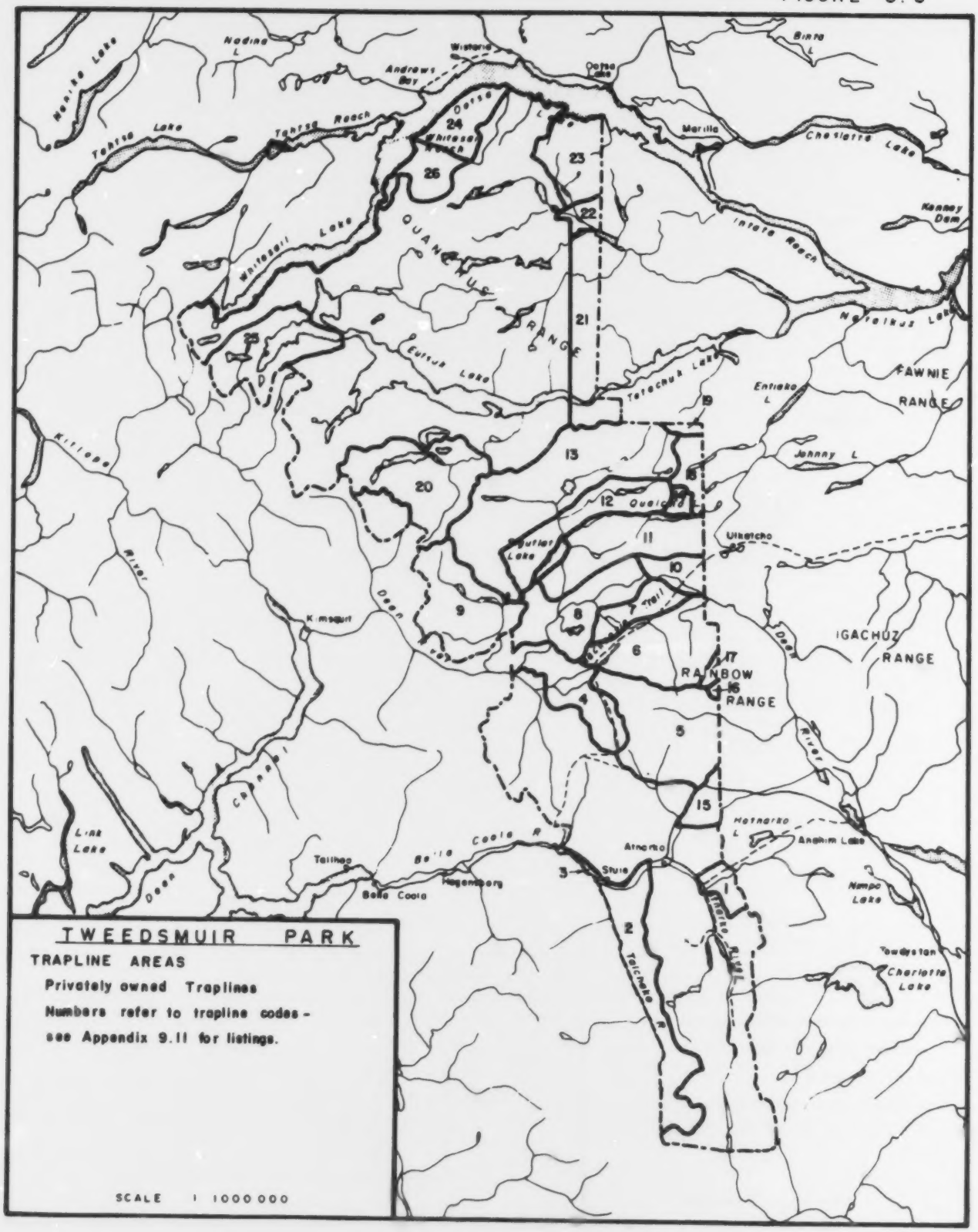
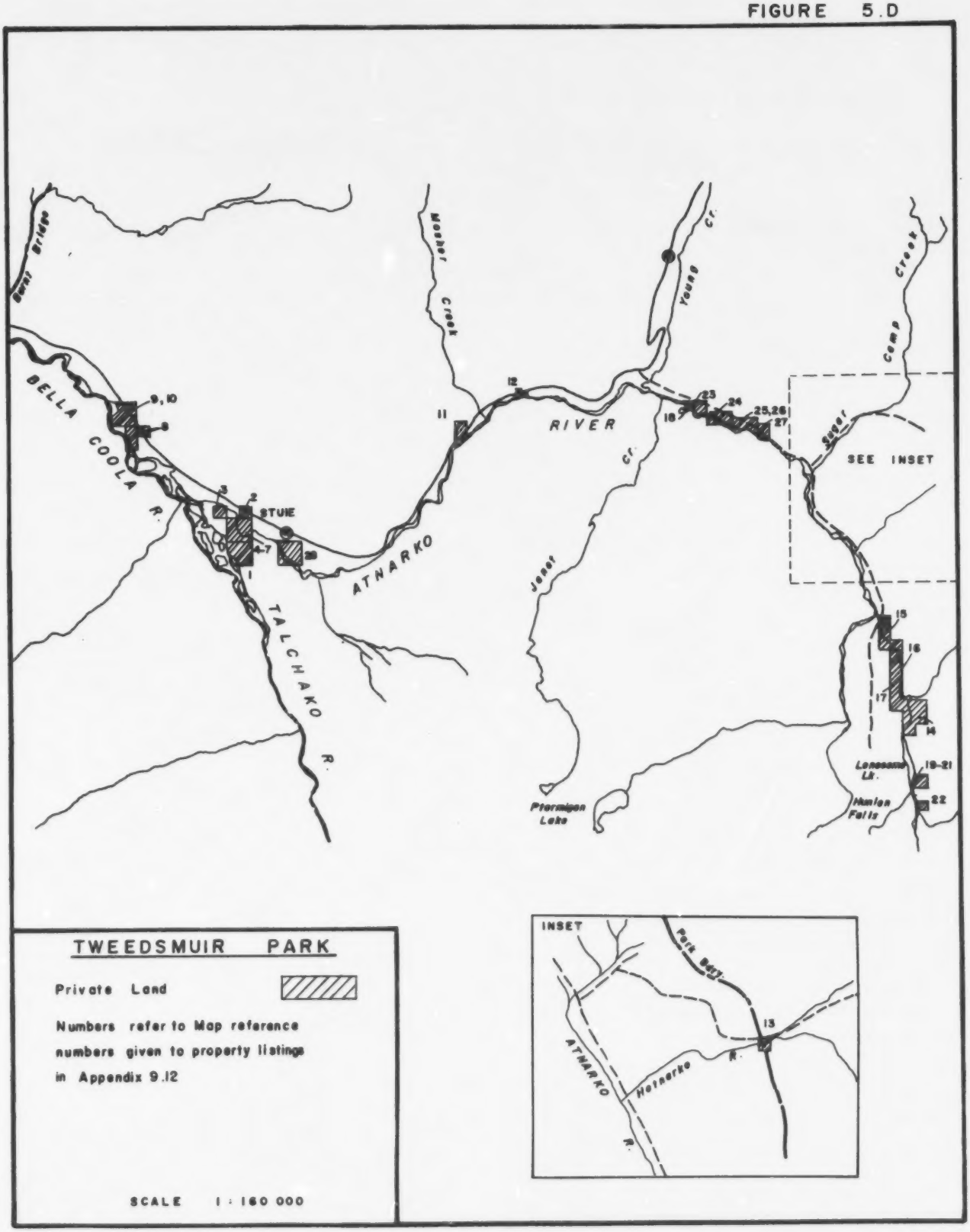

Nadina L
Andrews Bay
Tatlayoko Lake
Tatlayoko Reach
Whitesail Lake
QUANEMUS RANGE
Eutsuk Lake
Tatachua Lake
Entiako L
Johnny L
Ulgatcho
Kimsquit
Dean River
Dean
Trail
IGACHUZ RANGE
RAINBOW RANGE
Atnarko
Stuie
Tatlayoko L
Anahim Lake
Nimpo Lake
Chilcotin River
Bella Coola
Hagensborg
Talleo
Kwinamass R
Link Lake
Kleena Kleene
Charlotte Lake
Kenney Dam
Morrilla
Binta L
Davie Lake
Victoria
Dorsey L
Whitesail L
Eutsuk L
Quaich L
Burlar Lake
Hotnarko L
Tsoodzeton
Chilcotin R
FAWNIE RANGE
Nazelbuz Lake
Intata Reach
Tatlayoko Lake
Redpass Lake
Tatlayoko Lake
Tatlayoko Reach
Whitesail Lake
Eutsuk Lake
Kimsquit
Dean River
Link Lake
Bella Coola
Hagensborg
Talleo
Kleena Kleene
Anahim Lake
Nimpo Lake
Chilcotin River
Charlotte Lake
Kenney Dam
Morrilla
Davie Lake
Victoria
Nadina L
Binta L
Entiako L
Johnny L
Ulgatcho
Quaich L
Burlar Lake
Hotnarko L
Tsoodzeton
Atnarko
Stuie
Tatlayoko L
Dean
Trail
IGACHUZ RANGE
RAINBOW RANGE
FAWNIE RANGE
QUANEMUS RANGE
Nazelbuz Lake
Intata Reach
Eutsuk Lake
Tatachua Lake
Whitesail Lake
Andrews Bay
Tatlayoko Lake
Tatlayoko Reach
Redpass

FIGURE 5.D


Bend Bridge
BELLA COOLA R.
STUIE
ATNARKO
TALCHAKO R.
Mosher Creek
Young Cr.
RIVER
Jacot Cr.
Camp Creek
Jacot
SEE INSET
Ptarmigan Lake
Lonesome Lk.
Hunlen Falls
INSET
Park Boat
ATNARKO R.
Hotnarko R.
TWEEDSMUIR PARK
Private Land
Numbers refer to Map reference numbers given to property listings in Appendix 9.12
SCALE 1 : 160 000

6.0 EXISTING FACILITIES, DEVELOPMENT & RECREATION OPPORTUNITIES

Tweedsmuir Park abounds in recreational opportunities, subject to certain limitations, and the Park is not heavily developed in terms of tourist services or access. Since the only road access is along Highway 20 from Williams Lake, most of the tourist services are concentrated along that road. Other areas of the Park are very remote, with no services. Trails exist in varying conditions, but do not form a continuous network throughout the Park. All facilities and developments are listed below; those in the south part of the Park are also mapped on Figure 6.A. Recreational opportunities and limitations are identified in subsequent sections.

6.1 Accommodation

6.1.1 Public Campgrounds

a) HEADQUARTERS, Highway 20: 28 units and sani-station.
b) FISHERIES POOL, Highway 20: 14 units.
c) SAND CABIN BAY, Eutsuk lake, boat access: primitive.
d) ST. THOMAS BAY portage, Eutsuk Lake, boat access: primitive.
e) TURNER LAKES, no road access: primitive.

Note: numerous other primitive campsites along trails.

6.1.2 Commercial Lodges & Camps

a) TWEEDSMUIR WILDERNESS CENTRE, Stuie, Highway 20: accommodation.
b) TWEEDSMUIR LODGE, Stuie, Highway 20: accommodation, gas, campground.
c) HUNLEN WILDERNESS CAMP, Turner Lake, no road access: accommodation.

Note: also many small, remote lodges, cabins, camps (tent frames and foundations, etc.) owned by Park Use Permit holders; sites include Pondosy Bay entrance, Tesla, Oppy, Musclow, Mink, Wahla, Fenton and Eutsuk Lakes.

6.2 Day-use Facilities

6.2.1 Picnic Areas

All picnic sites are located along Highway 20, as follows:

a) East Branch
b) Young Creek
c) Fisheries Pool
d) Big Rock
e) Burnt Bridge Creek

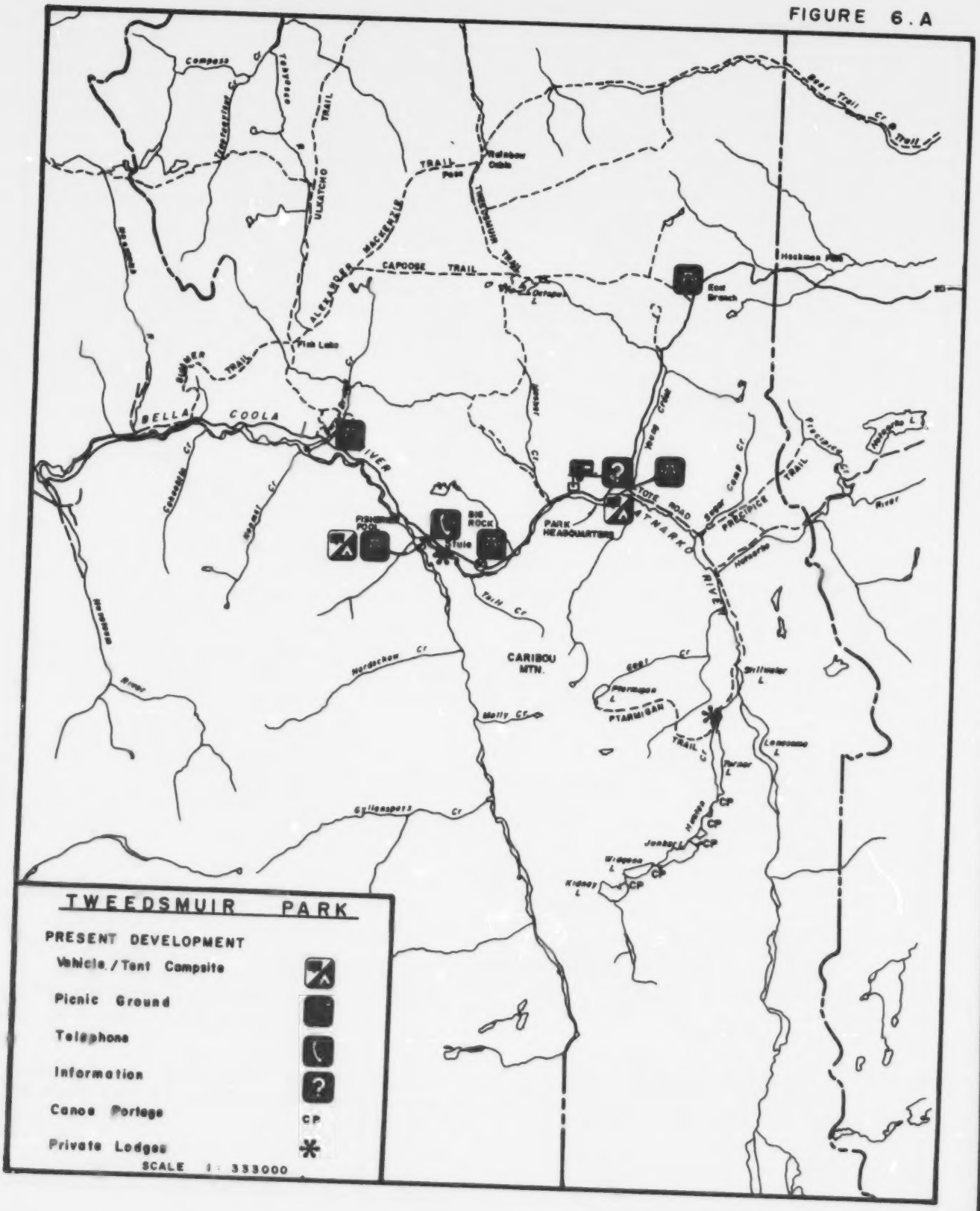
6.2.2 Boat Launches

a) Atnarko River at Fisheries Pool, Highway 20.
b) Whitesail Lake at Chikamin Bay and Eutsuk Lake at St. Thomas Bay: A 500 metre-long narrow gauge rail track connects the two. Boats up to 7 metres and 2 1/2 tonnes can be floated onto the rail car and hand-winched over the low portage.

6.2.3 Snowmobile Area

An area for snowmobiling has been zoned in the vicinity of Heckman Pass along Highway 20. Snowmobiling is not allowed elsewhere in the Park.

FIGURE 6.A


TWEEDSMUIR PARK
PRESENT DEVELOPMENT
Vehicle / Tent Campsite
Picnic Ground
Telephone
Information
Canoe Portage
CP
Private Lodges
SCALE 1 : 333000
BELLA COOLA
RIVER
PARK HEADQUARTERS
BIG ROCK
TOTE ROAD
CARIBOU MTN.
PTARMIGAN
TRAIL
CAPOOSE TRAIL
ALEXANDER MACKENZIE
ULKATCHO TRAIL
Rainbow Cabin
Hackman Pass
Rainbow Creek
Precipice Creek
Precipice Trail
Camp Creek
Stuie
Fish Pond
Snowshoe Trail
Compass Creek
Concession Creek
Hotnarko River
Hardscrow Cr.
Molly Cr.
Gillespeers Cr.
Twin Cr.
Coal Cr.
Shallwater L.
Lonesome L.
Junker L.
Widgeon L.
Kidney L.
Hungry Cr.
Tatlayoko L.
Tatlayoko River
Beef Trail Cr.
Beef Trail
Tatlayoko Pass
Tatlayoko Lake
Compass Cr.
Ulkatcho Cr.
Alexander Cr.
Mackenzie Cr.
Capoose Cr.
Capoose L.
Rainbow Cr.
Rainbow L.
Rainbow Pass
Rainbow Trail
Rainbow Creek
Rainbow Cabin
Hackman Pass
East Branch
Tatlayoko Lake
Tatlayoko River
Tatlayoko Cr.
Tatlayoko L.
Tatlayoko Trail
Tatlayoko River
Tatlayoko Pass
Tatlayoko Lake

6.3 Trails and Roads Within the Park

Tweedsmuir Park contains over 600 kilometers of trails and 57 kilometers of highway. The trails have been developed for a number of reasons; prehistoric "grease" trails, mining access roads, hunting and settler access trails, tourist-oriented routes, for example. Many of the original trails, such as the prehistoric grease trails from Dean River to Pondosy lake or Kimsquit River to Eutsuk Lake, and the tourist Tweedsmuir Trail, have overgrown from disuse and are now difficult or impossible to follow from ground level.

The best maps for trail users are in Koch's "Hiking in Tweedsmuir Provincial Park" (various scales), and Woodworth's "In the Steps of Alexander Mackenzie" trail guide (1:50,000 customized maps) for the Alexander Mackenzie Heritage Trail. Other maps such as the Ministry of Environment and Parks' Park Guide leaflets (1:250,000), B.C. Government topographical series (1:50,000 & 1:250,000) and B.C. Recreational Atlas (1:600,000) show some of the trails.

Appendix 9.14 is a written description of the route & distance, and, when known, the condition & origin, of each of the Park's discernible trails, & its highway. Many of these trails are shown on Figure 6.A and on the maps noted above.

6.4 Recreational Opportunities

Tweedsmuir Park contains numerous natural features which represent substantial recreation opportunity. Its natural attractions rank favourably with any of the major features found in other parks in the Province. The highlights of the Park are:

- Hunlen Falls, one of the highest single drop waterfalls in Canada at 260 meters, 366 meters overall.
- The Turner Lake chain, a unique sub-alpine canoe route high above the Atnarko Valley.
- Panorama Ridge, a high alpine hiking area south of Highway 20, above the Turner Lake chain.
- The Atnarko River, one of the most productive year round sport fisheries in B.C.
- The Rainbow Mountains, a spectacularly coloured, easily accessible volcanic alpine hiking area just north of Highway 20.
- The most scenic portion of the Alexander Mackenzie Heritage Trail.
- Eutsuk Lake, with its outstanding scenery and high recreation values, is the largest natural lake in the Province which is totally protected by a park.
- The Quanchus Range, a rolling volcanic mountain system with spectacular scenery and high summer wildlife values.

Tweedsmuir Park encompasses a very large and varied area of virtually untouched natural landscapes. Consequently, there are many and diverse recreational opportunities, although many of them require the expenditure of considerable effort and/or expense.

For the private car or recreational vehicle visitor along Highway 20, in the Atnarko Valley there is the spectacular and beautiful glaciated valley scenery, the chance to see bears feeding on spawning salmon in the river, picnic and camp sites adjacent to the Highway, boating on the river, and angling for many species of fish, including salmon. In winter, the Heckman Pass area along the Highway offers skiing and snowmobiling opportunities. Private accommodation is available at the two lodges in Stuie.

Trails provide hikers and horseback riders access to many wonderful wilderness areas. From Highway 20 hikers can walk to the scenic Upper

Atnarko Valley, historic Lonesome Lake, and spectacular Hunlen Falls, while both hikers and riders can use the trails to the Rainbow Range volcanic area, with its unusual landforms, alpine areas and caribou herd, or the historic Alexander Mackenzie Heritage Trail to Ulkatcho Indian Village. In the north, hikers and mountaineers will be interested in the rugged Chikamin and Coast Range mountains accessible in the west boundary area of the Park.

Canoists and boaters can enjoy the unspoiled scenery and beaches of Eutsuk Lake, reached over the portage from dangerous Whitesail Lake or via Redfern Rapids from Tetachuck Lake; other excellent boating opportunities exist on the Dean River, and canoists use the lakes and portages of the Turner Lakes Chain, with accommodation and canoe rental available at the wilderness camp on Turner Lake.

Anglers have, subject to angling regulations, the choice of highway-accessible Atnarko River or air-accessible Dean River, with salmon, steelhead and many other species, the Turner Lake Chain with cutthroat trout, Eutsuk Lake, or the numerous air-accessible lakes like Sigutlat and Tesla, some of which have commercially operated fishing camps. Hunters are subject to close regulation, but the Park contains big game species of moose, caribou, bear and mountain goat, mainly in the northern part of the Park.

A detailed inventory and description of the park's outdoor recreation features has been completed (Monkman, 1985). The significant recreation features are categorized and classified, and shown on 21 map sheets at a scale of 1:50,000. Each map sheet is accompanied by a written description, and in some cases a subjective evaluation of the recreation value of each of the mapped features. The report's summary narrative concludes that Hunlen Falls, the Rainbow Range and Alexander Mackenzie Heritage Trail are recreation features of "very high, or national, significance". Areas such as Monarch Mountain - Knot Lakes, Turner Lakes Chain, Atnarko and Bella Coola Valleys, Tsitsutl Peak, Octopus Lake - Mackenzie Pass, Pondosy and Eutsuk Lakes, and Quanchus and Chikamin Ranges are assessed as "provincially significant".

Specific locations of many of the above recreational highlights and opportunities are shown in Figure 6.A while Figure 6.B shows the Park's opportunities in a schematic map form for quick reference.

Even though the Park has trememdous recreation potential, its remote location and difficulty of access has precluded it from becoming a major recreation destination. This has its advantages since it has resulted in the Park remaining in an undeveloped state. As development has progressed elsewhere, the Park has become very significant for its wilderness value since it represents the largest single block of land designated for conservation in the Province. Its nearly one million hectares constitutes 22% of the entire Provincial Park System and about 1% of the Provincial land surface. It thus is a major source of wilderness recreation opportunity.

6.5 Recreational Limitations

The remote location and difficulty of access are in general the greatest factors limiting recreational use of the Park. As in all wilderness areas there are certain hazards and problems associated with recreational use; however, Tweedsmuir Park has a few unique limitations which are worthy of description.

Ootsa Lake is dangerous for boating. Although Alcan has cleared parts of the reservoir, most of the shorelines remain choked with dead standing snags. The reservoir is often windy and rough, and when sudden storms whip the waves to great heights, boaters can find themselves in trouble since

the standing snags around the shore make it difficult to get off the water. Although fishing can be good at this lake, the snags cause substantial gear loss. The snag problem will take a very long time to cure itself since wood rots very slowly underwater. Presently the snags are tending to rot and break off at the water line, leaving spike pointed deadheads still rooted to the bottom. The hazards of navigating Ootsa Lake pose severe limitations on the use the northern part of the Park receives. The lake is not recommended for canoes or small boats.

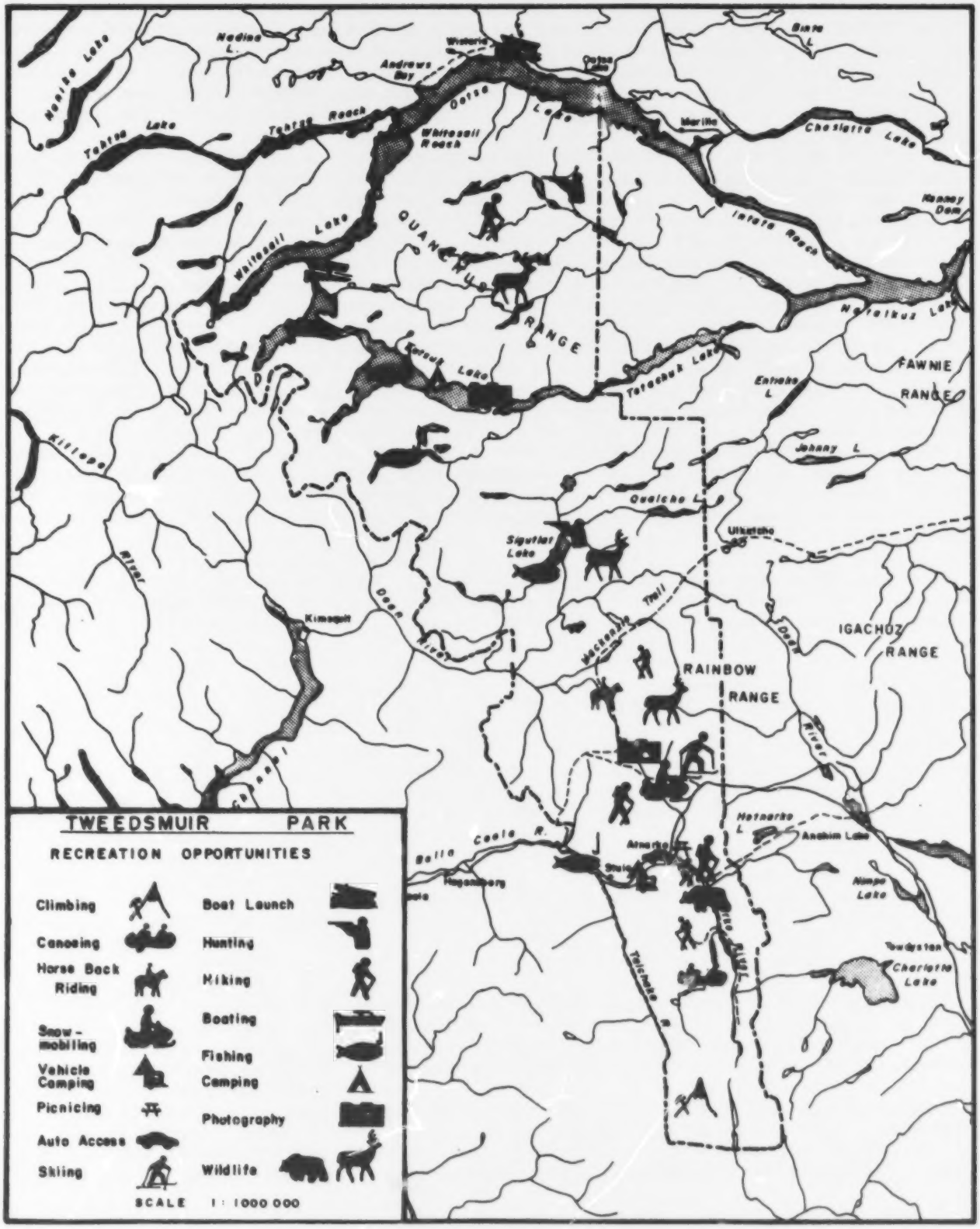
The rivers of the Park are not particularly well suited to boating. The Chezko has a major canyon which would require a lengthy portage. The Dean is only navigable about half way through the Park and below the Iltasyuko River confluence it is more or less one continuous rapid. The Atnarko is suitable for boating from Stuie on down, with the upper river suitable only for kayaking at appropriate water levels. Most of the other rivers are too small to warrant much interest by river boaters.

The interior of Tweedsmuir Park is infamous for its mosquito and blackfly populations. Certain low areas, such as the Dean Valley, and others on the plateau, can be particularly troubled with these insects. Although not hazardous, they are a factor in reducing the attraction of the Park. If certain precautions are taken, such as locating camps properly, and carrying the right equipment and repellent, the nuisance can be greatly reduced.

Bears are numerous, particularly along the salmon rivers, but as long as normal precautions are taken, they do not present serious limitations to use. The record of bear incidents in this Park is low; however, bears are perceived by many as a serious threat and a barrier to recreational uses in some areas.

Specific locations of many of the above recreational opportunities are shown in Figure 6.A while Figure 6.B shows the Park's opportunities in a schematic map form for quick reference.

FIGURE 6.B


Nadina L.
Andrews Bay
Tatlatui Lake
Tatlatui Reach
Whitesail Reach
Whitesail Lake
QUANRUA RANGE
Entsua Lake
Kitlope River
Kimsquit
Dean River
Sigutlat Lake
Ulkatcho
Dean River
Wacheena Trail
RAINBOW RANGE
IGACHOZ RANGE
Johnny L
Entsua L
FAWNIE RANGE
Tatuchus Lake
Chesletta Lake
Kenney Dam
Ootsa Lake
Morrice
Binta L
Bella Coola R.
Hotnarko L
Anahim Lake
Nimpo Lake
Charlotte Lake
Taseko R.
TWEEDSMUIR PARK
RECREATION OPPORTUNITIES
Climbing
Canoeing
Horse Back Riding
Snow-mobiling
Vehicle Camping
Picnicing
Auto Access
Skiing
Boat Launch
Hunting
Hiking
Boating
Fishing
Camping
Photography
Wildlife
SCALE 1 : 1000 000

7.0 MARKET AND USE ANALYSIS

Use and potential use of the Park is assessed and analyzed in the following sections by looking at such data as area population figures, highway traffic volumes, tourist origins and destination. As noted below, however, data sources are often inadequate or non-existant and conclusions are thus subject to revision as better data becomes available.

7.1 Population

Population counts are available for incorporated areas (villages, etc.) and for surrounding electoral (rural) areas. Accurate 1981 Federal Census counts are supplemented by 'estimates' from 1981 onwards by certain planning authorities.

North of the Park the Bulkley-Nechako Regional District contained some 38, 309 people in 1981, about one half of whom live in the incorporated communities such as Burns Lake (1,777), Houston (3,921), Smithers (4,570) and Vanderhoof (2,323), and many of the rest in the nearby semi-rural areas along Highway 16. That Regional District's electoral area 'E', encompassing all the areas north of the Park in the Ootsa and Francois Lake drainages, had 1,830 residents in 1981 (note: there are no permanent residents in the north part of the Park).

The Cariboo Regional District, covering a large area east of the Park was inhabited in 1981 by 59,252 people, many of whom live along the Highway 97 corridor semi-rural areas and in the incorporated communities of Quesnel (8,240), Williams Lake (8,362), and 100 Mile House (1,925). Electoral area "J" - "Chilcotin West" of the Cariboo Regional District, with a total population estimated at over 1,400 in 1986 (Cariboo Regional District, 1986) includes the mid-Dean River in the Park (uninhabited), the Upper Dean River communities like Anahim Lake and Nimpo Lake, and settlements along Highway 20 as far east as Redstone near Alexis Creek.

West of the Park, the Central Coast Regional District, with a 1981 population of 3,047, includes the west side of the Park and mainland coast communities. Of these 3,047 residents, 838 resided in Bella Coola townsite and nearby Indian Reservation, 511 in the Lower Bella Coola area and 644 along the Bella Coola and Atnarko Valleys in the Hagensborg - Firvale - Stuie - Atnarko community areas. The remaining 1000 or so are the residents of the coastal inlet communities.

7.2 Highway Traffic Volumes

Some idea of visitor usage and potential can be gained from examining highway traffic volume data, although wrong conclusions are easily drawn from such statistics. Raw summer traffic volumes are available for Highways 16, 97, 35 (south of Burns Lake) and 20 (Ministry of Transportation and Highways, 1983). "Raw" data makes no reference to time of day or type of traffic measured, and counts near communities include both local and long-distance traffic.

Eliminating most 'local' traffic, by using traffic volumes in the remoter section of the highways concerned, July - August 1983 traffic volumes were as follows (average vehicles per day).

Hwy 97, South of Williams Lake:	3,700	(North of Lac La Hache)
Hwy 97, North of Williams Lake:	3,100	(Marguerite)
Hwy 20, West of Williams Lake:	1,100	(Fraser River Bridge)
Hwy 16, East of Burns Lake:	1,900	(Sheraton)
Rte 35, South of Burns Lake:	2,800	(1982, much local traffic)
Hwy 16, West of Burns Lake:	2,000	(Topley)

7.3 Tourist Data

Data aimed directly at assessing tourist numbers is much more useful in an analysis of use and potential market for the Park. Unfortunately, there is little such data for the region and Park, but what exists is presented in the subsections below.

7.3.1 Regional Tourist Data

Very limited data on tourists has been collected by local tourist associations; Bella Coola Visitor Information Centre, Williams Lake and District Chamber of Commerce, and North by Northwest Tourism Association of B.C. (Smithers-based). Data is collected only from people seeking information at information offices, so all data is immediately stratified to eliminate the visitors who need no information and/or do not stop. Bella Coola and Williams Lake data consists only of sign-in visitors book counts, but the Williams Lake data does reveal that 13.5% of those who indicate their destination are coming from or going to Highway 20.

A more complete survey along Highway 16 (North by Northwest Tourist Association of B.C., 1984) questioned Information Centre patrons at five places between McBride and Prince Rupert. Unfortunately, responses were amalgamated so that specific data for the Burns Lake - Smithers area is unobtainable. Some interesting facts are revealed, however, which do pertain to Tweedsmuir Park use markets: 61% of the respondents were on a first visit to the area, while 18% had visited in the previous year, too; in descending order of importance. they mentioned sightseeing, camping, fishing, visiting friend / relative, boating and swimming as things they had participated in during their visit. When asked about the most important reason for their visit, 45% of respondents identified 'sightseeing', 28% 'travel to somewhere else' (19% Alaska, 5% 'south', 4% Alberta), 17% 'friends and relatives', 4% 'fishing' and under 1% 'boating'. Parties (usually 2 people) estimated they spent an average of $71 - $100 per night. Principal types of accommodation used were campgrounds (58%) and motels (24%). 32% of the respondents travelled by private car and 56% by some sort of recreational vehicle.

Concerning tourist origins and destinations, the North by Northwest survey indicates that 40% of respondents were headed to Alaska (only 19% mentioned 'travel to Alaska' as their most important reason for visiting). 25% of respondents were from B.C., 52% from the U.S., 5% from outside North America, and the rest from elsewhere in Canada. In contrast, records of visitor origin at Bella Coola indicate that only 16% of respondents were from the U.S. and 4% from overseas, whereas 70% were from B.C. and 10% other Canadians. Clearly, the U.S. tourists as observed on Highways 97 and 16 are not travelling to Bella Coola, especially the Alaska-bound ones, and a far greater percentage of tourists at Bella Coola (and presumably in the Park) are from B.C., compared to along the main highways. It bears repeating that the above figures represent only those people questioned in information offices, not a random survey of all area visitors.

A count by the author of traffic flows at two strategic points near Williams Lake revealed significant data to add to raw traffic volumes and respondent surveys described above. These counts, which distinguished between tourist and non-tourist traffic, were conducted on both Highways 97 and 20 near Williams Lake. They are presented in detail in Appendix 9.15 and used in the analysis (Section 7.4.1).

7.3.2 Park Use Data

Direct and indirect data is available for the numbers of people using the Park for recreation purposes.

The Ministry of Lands, Parks and Housing annual Park Data Handbook, indicated the following recent user statistics:

Atnarko Valley Campgrounds:	804 party nights (1985)
	713 party nights (1984)
Atnarko Valley Day Use Areas:	6,092 visitor days (1985)
	3,905 visitor days (1984)

This data is considered very approximate and probably the minimum use (Don Gough, personal comment).

B.C. Parks Branch maintains a resident at Chikamin Portage to supervise movement of boats between Whitesail and Eutsuk Lakes. Counts at Chikamin Bay indicated 372 parties passing through in 1985 and 578 parties in 1984. The massive drop in numbers in 1985 as compared to 1984 may have been caused by a 3-week fire closure and the unavailability of one of the major Ootsa Lake boat launch sites (Andrews Bay) in 1985.

Big game and other commercial guides, camp operators, air charter companies and lodge operators keep records of their customers. Their information has been utilized, along with the data above, in the analysis and conclusions presented below.

7.4 Data Analysis and Conclusions

The data presented in the sections above have been analysed to give a reasonable idea of the market potential and use of Tweedsmuir Park.

7.4.1 Market Potential

Based on 1981 census figures (Section 7.1) only about 5,200 people live within day-use driving distances of the Park, and perhaps some 100,000 within long-weekend driving distance. Otherwise, users will need a week or longer to visit the Park, unless travelling by air. Casual investigations by the author indicate that few people in even the 'long-weekend' area are aware of anything more than the name of the Park, however.

Comparisons between highway traffic volumes reveal that long-distance summer volume is between 3,100 and 3,700 vehicles per day on Highway 97, 2,000 on Highway 16 and 1,100 on Highway 20 near Williams Lake. Thus, Highway 97 is about 3 times as busy as Highway 20 and 50% busier than Highway 16. With no information on types of vehicles using these roads, though, these figures cannot be used to estimate, for example, how many actual tourists travel Highway 97 or how many tourists are travelling towards the Park.

The tourist traffic data from Section 7.3.1 and Appendix 9.15, however, enables the interpretation of raw traffic volume data. The 1986 hour-long counts on each of Highways 20 and 97 are comparable in volume to the 1983 raw traffic counts, and confirm the validity of both sets of figures. The 1983 survey reveals that while around half of Highway 97 traffic is 'tourist', only 19% of Highway 20 traffic is of this type. Thus, it would be erroneous to conclude that Highway 20, with one-fifth as much traffic as Highway 97, has one-fifth as many tourist vehicles; in reality, it has only one-fifteenth as many!

Assuming 50% of Highway 97 vehicles are tourist vehicles, about 1,900 long-distance tourist vehicles pass through Williams Lake per peak summer day, of which about 200 venture onto Highway 20. It is likely that these tourists approximate the personal profiles identified for Highway 16 travellers in Section 7.3.1. Extrapolating traffic count observations to Highway 16, likely some 1,000 tourist vehicles pass along that Highway each peak summer day, while a very small and unknown number of these will be Tweedsmuir Park visitors. On both Highways 16 & 97, these tourists are

already travelling through the area on their way to Alaska, visiting relatives or just touring around and thus represent probably the largest potential market for the Park. Moreover, these tourists' main reasons for travelling (sightseeing), and preferred accommodation type (campgrounds) are compatible with what the Park has to offer.

7.4.2 Park Usage

No records exist of how individual visitors spend their time in the Park, and no overall count of visitors is recorded. Thus, estimates of park usage can only be made from isolated sources, many of which are rough estimates, and some visitors will be missed. Since park visit durations are unknown, use must be estimated in terms of visitor-days (number of visitors x average number of days spent).

Based on Highway 20 counts, perhaps 200 tourist vehicles per day (640 people approximately) travel from Williams Lake along Highway 20: this is about 320 people heading towards Tweedsmuir Park (the rest are returning along the same route). Over the tourist season, this could represent up to 30,000 visitors. Since no counts exist west of the Fraser River, an unknown number of these visitors will travel all the way to Tweedsmuir Park. Counts are not reliable enough to indicate vehicle visits to the north part of the Park.

The other potential sources of park usage data are the reported uses of public and private Park facilities, as described in Section 7.3.2. This data can be used to produce approximate visitor days of Park use per recent typical year, as shown below:

Approximate Visitor-Days of Park Usage (average Year)

Type of Visit	Visitor-Days
'Great Circle' boating trips via Chikamin Portage	9,250
Jet boat trips to Eutsuk Lake via Redfern Rapids	unknown
Campgrounds - Atnarko Valley (overnight visits)	2,600
Vehicle-based visits to Atnarko Valley picnic areas	6,000
Lodges - Stuie (overnight visits)	5,000
Hunlen Wilderness Camp (overnight visits)	1,200
Big-game guided hunting trips	140
Commercial guide trips (angling, etc.)	200
Other fly-in visits (Airline reports)	850
TOTAL	25,240

Note: Unless reliable information available, estimates used are:
1. 5 days per average visit.
2. 3.2 people per average group.
3. 1985 or 1985-6 season data (or a recent but more typical year).

Thus, a rough estimate of park use for an average recent year is 25,000 visitor days. Although jet boat visitors have been ignored, and a few visitors may have been double-counted, the estimate stands as the best available with present data sources. In explanation of the above figures, most day-use visitors counted at the picnic areas are likely from motels and campgrounds in the Anahim Lake and Bella Coola areas, not from accommodation within the Park; long-distance hikers are encouraged to park their cars at Park Hadquarters, and are not usually included in vehicle counts at day-use areas.

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9.0 APPENDICES

APPENDIX 9.1 ORDERS-IN-COUNCIL SUMMARY

Twenty-three Orders-In-Council have been authorized by the B.C. Government with direct reference to Tweedsmuir Park. They are summarized below in terms of O.I.C. #, year of approval, purpose, and Provincial Act to which they are pursuant:

OIC #	YEAR	PURPOSE	PURSUANT TO...ACT
241	1936	Reserves vacant land	LAND
715	1938	Establishment of Park, cancels #241/36	LAND/PROVINCIAL PARKS
1660	1940	Reclassifies Park as Class "B"	FOREST
2055	1949	Mining allowed with restrictions	FOREST
2558	1951	Mineral reservation	MINERAL
2559	1951	Placer reservation	PLACER MINING
1538	1955	Reduction in size of Park	FOREST
484	1955	Correction to #1538	FOREST
2763	1956	Rescinds #1538/55. Enlarges Park	FOREST
396	1960	Restricts mining	MINERAL/PLACER MINING
1962	1960	Amends #396/60	MINERAL/PLACER MINING
659	1964	Amends #2055/49	REC. & CON. ACT
642	1967	Establishes Eutsuk Nature Conservancy	PARK
674	1970	Establishes Rainbow Nature Conservancy	PARK
1535	1970	Timber exchange	PARK
3260	1971	Authority to purchase Lot 319	PARK PARK
4425	1971	Corrects #3260/71	
3322	1972	Authority to purchase Park User Permit #146	PARK
3631	1972	Authority to exchange land, Lot 771	PARK
1442	1973	Rescinds #2055/49, #659/64. Restricts mining & prospecting	PARK
2953	1973	Amends #1535/70	PARK
1434	1974	Exempts miners from fees	REVENUE
2510	1981	Amends B.C. Requirements re. mining, etc.	FIN. ADMIN.

APPENDIX 9.2 WATER LICENSES SUMMARY

The Water Licenses listed below are those held within or immediately adjacent to the present Park. All licenses are classified as "conditional".

License #	Issuing Year	Holder	Purpose
19847	1950	Alcan	Store, divert & use, Nechako River, Skins Lake & Nanika River, for storage & power purposes. -storage: 35 million acre-feet -diversion: 9,500 cubic feet per second
26518	1963	Corbould	Irrigation/domestic: Tweedsmuir Lodge, Stuie. -irrigation: 10 acre feet per year -domestic: 2,000 gallons per day
45704	1976	Env. Canada	Hatchery water supply. S 1/2 of NE 1/4, Sect. 32, TWP. 9, Range 3, Coast Dist. -6.5 cubic feet per second
60131	1985	Stewart	Domestic. Lot 1093, between Firvale & Stuie. -1,000 gallons per day

APPENDIX 9.3 HUNTING REGULATIONS SYNOPSIS SUMMARY (1986-87)

Fishing regulations for the entire Province are outlined in the Ministry of Environment and Park's British Columbia Hunting Regulations Synopsis, published annually.

The regulations summarized below are those referring specifically to the Tweedsmuir Park area for the 1986 - 1987 season, and are subject to change. Figure 2.F shows the boundaries of the Management Units referred to in the regulations: The Park includes Management Units 5-10 and 5-11 of the Cariboo Resource Management Region, and parts of Units 6-1 and 6-2 of the Skeena Region.

(a) Province-wide Information: The Synopsis should be referred to for general information on hunting in B.C. Topics covered include the following: Definition of terms; unlawful actions; penalties; special restrictions and requests (grizzly bear family unit and younger grizzly bear hunting prohibition, requests to avoid shooting female mountain goats and all collared (research) wildlife); license requirements; notice to non-resident hunters; license fees; general open season and bag limit facts; possession, transport and reporting; hunting methods; Park restrictions; limited entry hunting; highway no shooting areas (includes 0.4 kilometers either side of Highway 20).

(b) Provincial Regional Regulations: Regulations applying only to specific areas are established as detailed below. Season bag limits for big and small game and daily bag limits for game birds are shown alongside any open season dates (no dates = no open season); an entry such as "2" for big game (except ungulates) and small game means the season bag limit and possession limit is two animals; an entry such as "2(1)" for ungulates means the season bag limit of that species is two animals in the aggregate, one of which may be antlerless; an entry such as "10(20)" for upland game birds and migratory game birds means the daily bag limit is 10 while the possession limit is 20.

(1) Cariboo Region (i.e. Management Units 5-10 and 5-11 in the Park)
COMPULSORY REPORTING: It is mandatory for all mountain sheep, mountain goat, grizzly bear, cougar, caribou, bobcat, lynx and wolverine to be inspected.
NATURE RESERVE: Hunting is prohibited in the Rainbow Nature Conservancy Area.
FIREARMS DISCHARGE: Only between September 2 and June 15, during a lawful game hunting season.
OPEN SEASONS: BAG LIMITS: POSSESSION LIMITS:
Mule (Black-tailed) Deer: Sept. 10 - Nov. 16 (Bucks), Oct. 15 - 17 (Antlerless): (bag limit for male mule deer is 1. Bag limit for antlerless mule deer is 1).
Moose: Unit 5-10: Bulls Sept. 10 - Nov. 16: 1(1).
Antlerless: Oct. 24 - 26.
Moose: Unit 5-11: Bulls: Sept. 10 - Oct. 19: 1.
Bighorn Mountain Sheep: No open season (hunting not allowed).
Mountain Goat: Unit 5-11: Sept. 1 - Oct. 26: 1 (requested to select males).
Mountain Goat: Unit 5-10: No open season.
Caribou, Grizzly Bear, Cougar, Fox, Sharp-tailed Grouse, Pheasant, Chukar Partridge, Band-tailed Pigeons: No open season.
Black Bear: Sept. 1 - Nov. 16, 1986: 2 : April 15 - June 30, 1987
Wolf: Sept. 2 - March 31: 3.

APPENDIX 9.3 (continued):

Bobcat: Dec. 1 - Feb. 28: 2.
Coyote: Sept. 2 - March 31: no bag limit.
Lynx: Nov. 15 - Feb. 15: 1.
Blue, Spruce (Franklin) and Ruffed Grouse: Sept. 10 - Nov. 16: 10 of each (30 of each).
Ptarmigan: Sept 1. - Oct. 31: 10(30).
Ducks, etc.: Sept. 15 - Dec. 15: Ducks 8(16), Coots 10(20), Snow Geese 5(10), Ross' Geese 5(10), White-fronted geese 5(10), Canada Geese 5(10), Common snipe 10(20), Note: daily bag limit for all geese in aggregate is 5, possession 10.

(ii) Skeena Region (i.e. Management Units 6-1 and 6-2 in the Park)
LIMITED ENTRY HUNTING: Caribou: see Synopsis for details; Moose: Sept. 10 - Oct. 17 bull moose (see Synopsis).
NO HUNTING AREA: Eutsuk Nature Conservancy and areas west: see Synopsis map.
DISCHARGE OF FIREARMS: Only during a lawful game hunting season.
OPEN SEASONS: BAG LIMITS: POSSESSION LIMITS (see notes above):
Mule (Black-tailed) Deer: Bucks - Sept. 10 - Oct. 31: 1 (extended to Nov. 15 for certain antler bucks - see Synopsis).
Moose: Bulls Oct. 18 - Nov. 15: 1 (see LIMITED ENTRY HUNTING above).
Antlerless Moose, raccoon, sharp-tailed grouse, black brant, band-tailed pigeons: No Open Season.
Mountain Goat: Aug. 15 - Oct. 15: 1.
Grizzly Bear: Sept. 15 - Oct. 26: 1 April 15 - June 15
Black Bear: April 15 - Nov. 15: 2.
Caribou: see LIMITED ENTRY HUNTING above.
Wolf: Sept. 1 - march 31: 10.
Coyote: Sept. 1 - March 31: no bag limit.
Lynx: Nov. 15 - Feb. 15: 1.
Wolverine: Oct. 15 - Nov. 15: 1.
Blue Grouse: Sept. 10 - Nov. 15: 10(30).
Spruce (Franklin) & Ruffed Grouse: Sept. 10 - Nov. 15: 10(30). (note: the daily aggregate bag limit for grouse (all) is 10).
Ptarmigan: Aug. 15 - Feb. 28: 10(30).
Ducks, etc.: Sept. 1 - Nov. 30: bag limits identical to Region 5 above.
BOW & ARROW ONLY SEASONS: available for Mule Deer and Moose - see Synopsis.

note: All data in this Appendix is intended only as a general guide for the reader - hunters should confirm all information in the current Synopsis and/or with Ministry of Environment and Parks officials.

APPENDIX 9.4 FISHING REGULATIONS SYNOPSIS SUMMARY (Apr. 1986 - Mar. 1987)

Fishing regulations for the entire Province are outlined in the B.C. Ministry of Environment and Park's British Columbia Sport Fishing Regulations Synopsis, published annually. The regulations summarized below are those referring specifically to the Tweedsmuir Park area for the April, 1986 to March, 1987 season, and are subject to change. Figure 2.F shows the boundaries of the Management Units referred to in the Regulations: The Park includes Management Units 5-10 and 5-11 of the Cariboo Resource Management Region, and parts of Units 6-1 and 6-2 of the Skeena Region.

(a) Province-wide Regulations: These apply to all non-tidal B.C. waters and cover license requirements, general restrictions and prohibitions, and definitions of terms; the Synopsis should be referred to for definitions of all terms used below.

(b) Provincial Regional Regulations: Special Regulations, applying to certain specific waters, are established as follows: (all fish length limits are 'fork lengths').

(i) Region 6 - Skeena (i.e. Management Units 6-1 & 6-2 in the Park).
CATCH QUOTAS (Maximum Daily Number):
Possession quotas equal 2 daily quotas, except sturgeon.
5 trout (as defined) can be retained per day, none of which can be under 30 centimeters, and only one of which can be over 50 centimeters. Only 3 trout of the daily limit can be caught from a stream: steelhead are part of the daily trout quota and only one steelhead can be retained per day (see definition of steelhead); as well, no more than 2 steelhead per month may be taken from Region 6 to a yearly maximum of 10 in all B.C. waters combined.
15 kokanee from lakes; no kokanee can be taken from a stream.
25 whitefish, with no size restrictions.
10 burbot, 8 arctic grayling, 8 northern pike; all with no size restrictions.
One sturgeon per year may be retained, which must be longer than 100 centimeters, and a free sturgeon permit is required.
Salmon: see Section (c) below.

OTHER RESTRICTIONS:
No Fishing in any stream April 1 - June 30.

(ii) Region 5 - Cariboo (i.e Management Units 5-10 & 5-11 in the Park)
CATCH QUOTAS: (maximum daily number):
Possession quotas equal 2 daily quotas, except sturgeon.
6 trout (as defined) can be retained per day, no more than 4 of which can be from streams. Only 2 trout of the 4 daily possession from streams can be over 30 centimeters. Only 2 trout of those taken from lakes as part of the daily limit can be over 50 centimeters. Steelhead are part of the daily trout quota and only 1 steelhead can be retained per day (steelhead as defined). As well, no more than 2 steelhead per month may be taken from Region 5 to a yearly maximum of 10 in all B.C. waters combined.
10 kokanee from lakes; no kokanee may be taken from a stream.
25 whitefish, and 10 burbot, with no size restrictions.
One sturgeon per year may be retained, which must be longer than 100 centimeters, and a free sturgeon permit is required.
Salmon: see Section (c) below.

APPENDIX 9.4 (continued):

OTHER RESTRICTIONS:
No fishing in any stream April 1 - June 30 except Unit 5-11.
Atnarko River: (i) No fishing from Lonesome Lake downstream to signs located near Atnarko Provincial campsite (and tributaries). (ii) Single Hook. (iii) Bait Ban below Atnarko Provincial campsite, May 1 - July 15. (iv) Special Waters (and tributaries). (v) No angling from power boats. (vi) No trout under 30 centimeters may be taken (includes tributaries except Young Creek - see below).
Bella Coola River: (1) Single Hook. (ii) Bait Ban, May 1 - July 15. (iii) Special Waters (and tributaries). (iv) No angling from power boats. (v) No trout under 30 centimeters may be taken (includes tributaries, except Noosgulch River).
Dean River: (i) No trout under 30 centimeters may be taken. (ii) Anahim Lake to Iltasyuko River - fly fishing. (iii) Iltasyuko River to Kalone Creek (beyond park boundary to west) - No Fishing.
Hunlen Creek: No fishing - April 1 - June 30.
Takia Lakes & tributaries, Tanya Lakes' tributaries: No fishing.
Young Creek: (i) No Fishing below Highway 20. (ii) Trout under and over 30 centimeters may be taken above Highway 20. (iii) Special Waters.

(c) Salmon Regulations in Non-Tidal Waters (Federal Government Management).

CATCH QUOTAS:
Possession Quota equals 2 daily quotas.
Sockeye, pink and chum salmon may not be retained. In addition, chinook and coho under 30 centimeters must be released immediately, and none retained. Regulations concerning chinook and coho over 30 centimeters, at time of printing of Synopsis, are as follows:
4 chinook or coho (combined) greater than 30 centimeters may be retained per day, but only 2 of these may be over 50 centimeters. Of the 2 chinook or coho (combined) over 50 centimeters, no more than one may be a chinook from either the Bella Coola or Atnarko Rivers, and no more than one may be a coho from either the Bella Coola or Atnarko Rivers. In addition, there is an annual catch quota of 10 chinook over 50 centimeters for all non-tidal waters combined (6-day license allows only 4).

OTHER RESTRICTIONS:
All province-wide and regional regulations and closures apply to salmon fishing. In addition, salmon closures in the Park are as follows:
July 15 - October 15: Atnarko River closed for chinook.
July 15 - August 31: Atnarko River closed for coho below signs 50 meters below Corbould Bridge.
September 1 - October 15: Atnarko River closed for coho above signs 50 meters below Corbould Bridge.
All year, the Klinaklini River and all tributaries, which includes Knot Lakes, are closed to Chinook; however, a falls apparently prevents this species from entering the Park via the Klinaklini River.

APPENDIX 9.5 TWEEDSMUIR PARK FISHERIES INVENTORY DATA: LAKES IN THE SKEENA RESOURCE MANAGEMENT REGION (North to South)

Code	Lake	No. of Fish Netted in Specified Period: TOTAL Game + CO	"Game" Fish: TROUT RT	CT	ST	DV	MW	KO	PS	BU	"Coarse" Fish: LK CH	LN S	LS S	N SQ	SC	Net HR	YR
1	Glatheli	50 + 30	15				30	5				18		12		?	75
2	Ghitesli	53 + 139	16				37					10	21	108		?	75
3	Thletelban	51 + 14	5				46					7	2	5		?	75
4	Chief Louis	26 + 66	16				10					10		56		?	75
5	Fenton	18 + 38	18								2		36			15	78
6	Blanchet	31 + 43	31								8		35			13	78
7	St. Thomas	38 + 57	38								2		55			?	82
8	Eutsuk 1	2 + 1					1	1		Y		1			Y	3	82
9	Eutsuk 2	12 + 4					12					1		3		4	82
10	Eutsuk 3	3 + 1	1				2					1				4	82
11	Eutsuk 4	16 + 17	13				1	2				4		13		17	82
12	Eutsuk 5	20 + 1	5				14	1						1		5	82
13	Eutsuk 6	4 + 0	2				2									4	82
14	Eutsuk 7	9 + 4	1				8					4				5	82
15	Eutsuk 8	19 + 9	12					7				4		5		15	82
16	Eutsuk 9	17 + 2	6				11					2				5	82
17	Eutsuk 10	16 + 6	2				6	8				5		1		5	82
18	Eutsuk 11	5 + 4	4				1					4				6	82
19	Eutsuk 12	29 + 2	10					19				1		1		16	82
20	Lindquist	32 + 0	32													?	75
21	Surel	0 + 0														?	75
22	Musclow	79 + 0	44					35								14	78
23	Pondosy	13 + 20	6				3	4				17	2	1		12	78
24	Mink	7 + 319	5				1			1		56	3	250	1	14	78
25	Wahla	64 + 67	5				59					63	1	3		14	78
26	Tesla		6				7	107				21	1	1		14	78

KEY:

NOTES: Where more than one long-duration netting available, catches are averaged. See Appendix 9.7 for written lake descriptions.

ABBREVIATIONS:

CODE = CODE NUMBER ON FIGURE 2.G
GAME = GAME FISH (All species)
CO = COARSE FISH (All species)
RT = RAINBOW TROUT
CT = CUTTHROAT TROUT
ST = STEELHEAD TROUT
DV = DOLLY VARDEN CHAR
MW = MOUNTAIN WHITEFISH
KO = KOKANEE SALMON
PS = PACIFIC SALMON
BU = BURBOT
LK CH = LAKE CHUB
LN S = LONG NOSE SUCKER
LS S = LARGE SCALE SUCKER
N SQ = NORTHERN SQUAWFISH
SC = PRICKLY SCULPIN
HR = # HRS. NET WAS SET
YR = YEAR OF SURVEY 19__
Y = not caught during inventory, but known to exist at times

SOURCES: Hazelwood, 1975
Fish Inventory Files, Ministry of Environment and Parks, Fisheries Branch, Smithers

APPENDIX 9.6 TWEEDSMUIR PARK FISHERIES INVENTORY DATA: LAKES IN THE CARIBOO RESOURCE MANAGEMENT REGION (North to South)

Code	Lake	No. of Fish Netted in Specified Period TOTAL Game + CO	"Game" Fish TROUT RT	CT	ST	DV	MW	KO	PS	"Coarse" Fish BU	LK CH	LN S	LS S	N SQ	S C	Net HR	YR
27	Nahlouza	16 + 40	15							1		21	2	16	1	12	78
28	Oppy	0 + 0														24	78
29	Sigutlat	9 + 42	9									39	2	1		12	78
30	Iltasyuko	6 + 27	4							2		23	3	1		13	78
31	Squiness	15 + 84	15									67		17		20	75
32	Tanya - Upper	32 + 14	19		Y	11					2	14				2.5	75
33	Tanya - Lower	55 + 80	55		Y							80				20	75
34	Lonesome	18 + 68		5	Y	7	6		Y			15	1	52		14	75
35	Turner	20 + 0		20												12	75
36	Cutthroat	42 + 0		42												16	75
37	Vista	10 + 0														14	75
38	Junker	23 + 0		23												14	75
39	Widgeon	10 + 0		10												16	75
40	Kidney	22 + 0		22												12	75
41	Hunlen	18 + 0		18												19	75
42	Tenas	14 + 4	1	7	Y		6		Y				1	3	Y	14	75
43	Rainbow	32 + 5			Y	3	29		Y				1	4		18	75
44	Elbow	25 + 25		4	Y	9	12		Y			8	1	16	Y	15	75
45	N. Knot	14 + 0	1			4	9								Y	15	75
46	S. Knot	7 + 0	2			2	3								Y	21	75

KEY:

NOTES: Where more than one long-duration netting available, catches are averaged. See Appendix 9.7 for written lake descriptions.

ABBREVIATIONS:

CODE = CODE NUMBER ON FIGURE 2.G
GAME = GAME FISH (All species)
CO = COARSE FISH (All species)
RT = RAINBOW TROUT
CT = CUTTHROAT TROUT
ST = STEELHEAD TROUT
DV = DOLLY VARDEN CHAR
MW = MOUNTAIN WHITEFISH
KO = KOKANEE SALMON
Y = not caught during inventory, but known to exist at times
PS = PACIFIC SALMON
BU = BURBOT
LK CH = LAKE CHUB
LN S = LONG NOSE SUCKER
LS S = LARGE SCALE SUCKER
N SQ = NORTHERN SQUAWFISH
SC = PRICKLY SCULPIN
HR = # HRS. NET WAS SET
YR = YEAR OF SURVEY 19__

SOURCES: Hazelwood, 1975
Fish Inventory Files, Ministry of Environment and Parks, Fisheries Branch, Smithers

APPENDIX 9.7 LAKE DESCRIPTIONS

The following section presents known reliable information on the fishery resource in the Park. Subjective evaluations and general fisheries comments, mostly from Hazelwood, 1975 and Ministry of Environment and Parks lake inventory files, are presented in note form for all surveyed lakes and streams, in approximately north to south order through the Park. Inventory data listing fish species, abundance, and details of netting are summarized in Appendices 9.5 and 9.6 while Figure 2.G maps the geographical locations cited in the text.

WOLVERINE LAKES (South of Mt. Wells): No data. Rainbow trout apparently the only fish species.

GLATHELI LAKE: Low total dissolved solids, much shallow water and aquatic vegetation. No large fish caught, but all in good condition. Good spawning and rearing habitat for salmonids. Chelaslie River and other inlets are good fish habitat.

CHELASLIE RIVER (between Glatheli & Ghitezli Lakes): Excellent fishing , with healthy rainbow trout larger than in lakes (average 240 grams). Excellent spawning, rearing and holding habitats.

GHITEZLI LAKE: Low total dissolved solids but shallow, thus moderate productivity. High numbers of fish caught, especially Northern Squawfish. Excellent squawfish habitat. No Kokanee observed or downstream.

CHELASLIE RIVER (between Ghitezli & Thletelban Lakes): Gravel spawning habitat. Trout and squawfish seen.

THLETELBAN LAKE: Low total dissolved solids but shallow, thus moderate productivity.

CHELASLIE RIVER (between Thletelban & Chief Louis Lakes): Sluggish, meandering through marsh and sedge meadows. Trout and fry observed. Good holding and rearing potential, but no gravel for spawning habitat.

CHIEF LOUIS LAKE: Low total dissolved solids but shallow, thus moderate productivity. Trout small (average 150 grams) but fair numbers. Many coarse fish. Stream from Uduk Lake has trout, and good spawning / fair rearing potential.

FENTON LAKE: Rainbow trout rated moderately abundant (average 240 grams). Little good spawning habitat.

BLANCHET LAKE: Rainbow trout abundance high, but small in size (average 189 grams, range 80 - 280 grams). High elevation and very low total dissolved solids, thus low productivity. Two inlet streams rated good habitat for recruitment (rearing).

ST. THOMAS LAKE: Rainbow trout abundant but "unhealthy". Coarse fish large (average 30 centimeters).

ST. THOMAS RIVER: No fish observed and poor habitat, upstream of St. Thomas Lake. Downstream, coarse fish observed, good rearing but poor spawning habitat.

APPENDIX 9.7 (continued):

EUTSUK LAKE: Lake inventoried at 12 points. Besides species found on inventory, 1951 survey indicated presence of burbot, sculpins and steelhead.

MINK LAKE: A small lake with seasonal inlet and outlet, overrun with coarse fish, with very low recruitment potential for game fish.

LINDQUIST LAKE: Depth as much as 122 meters. Low total dissolved solids and narrow littoral indicates very low productivity. Abundant rainbow trout, up to 500 grams (average 180 grams). Lakeshore boulders provide suitable recruitment habitat. Inlet streams good holding and spawning, but poor recruitment habitat. No habitats on outlet.

SUREL LAKE: Low total dissolved solids, restricted littoral zone and glacial flour in the water, thus very low productivity. No netting catches. Inlets provide good trout habitat.

MUSCLOW LAKE: Very abundant, small rainbow trout (average 226 grams, range 106 - 370 grams). Stunted kokanee for rainbow trout to feed on. No coarse fish. Inlet stream from Cosgrove Lake has rainbow trout and good recruitment habitat.

WAHLA LAKE: Few rainbow trout, but relatively large (average 407 grams, range 365 - 435 grams). Good trout habitat is sparse, and may be a limiting factor. Well-reputed with anglers.

TESLA LAKE: Rainbow trout low abundance, but large (1 kilogram common, average 677 grams, range 150 - 1180 grams). Kokanee abundant, stunted (mature at 12 centimeters), eaten by rainbow trout. High quality angling, especially at outlet where trout habitat is good.

NAHLOUZA LAKE: Relatively shallow with good spawning and rearing habitat. Rainbow trout moderately abundant but small (average 166 grams, range 120 - 222 grams). Inlet Detna Creek rated good rearing habitat, and inlet Unchietlat Creek moderately productive habitat. Outlet Nahlouza Creek rated good habitat in lower 5 kilometers.

OPPY LAKE: No fish caught, probably none in lake. 4 to 6 inlets rated as salmon production habitat, outlet Oppy Creek has moderate to good salmon habitat in quieter stretches.

SIGUTLAT LAKE: Moderately abundant rainbow trout (average 252 grams, range 120 - 340 grams). Inlet Nahlouza Creek high productive capability in lower 5 kilometers, with good capability in Iltasyuko River. Outlet Iltasyuko River prime fishing at lake exit, moderate - low productivity with 20 meter falls 1 kilometer from Dean River confluence.

ILTASYUKO LAKE: Comparatively low fish abundance and small size (average 216 grams, range 126 - 320 grams). Inlets and outlets rated good for salmon recruitment and high quality salmon habitat in outlet.

SQUINESS LAKE: Shallow, moderately productive lake with dissolved oxygen shortage. Large and numerous fish, including 180 - 925 gram rainbow trout in excellent condition. Unnamed lakes nearby have rainbow trout and coarse fish.

APPENDIX 9.7 (continued):

TANYA LAKES: 2 shallow moderately-productive lakes separated by meadows. Besides inventory species, Dolly Varden likely in upper lake as well. Inlets good habitat with rainbow trout and Dolly Varden. For outlets see Dean River below. Lake believed sporadically entered by steelhead at limit of migration.

STILLWATER LAKE (downstream from Lonesome Lake): Narrow, shallow, recent (1936) rock-slide lake. No inventory, but has cutthroat trout, steelhead trout, whitefish and Dolly Varden, plus salmon, with moderately high productivity. Inlet Atnarko River has good habitat and plenty of game fish.

LONESOME LAKE: Long, narrow and deep lake, productive at south end. Large but relatively few trout. Inlet Atnarko River good habitat with suckers, trout, whitefish, Dolly Varden and salmon.

HUNLEN CREEK DRAINAGE: TURNER, CUTTHROAT, VISTA, JUNKER, WIDGEON, KIDNEY & HUNLEN LAKES: Cutthroat trout population originating from 2 pairs of Atnarko trout introduced by R. Edwards in 1949. Drainage is isolated from Atnarko Valley by high Hunlen Falls. All lakes and Hunlen Creek sections contain cutthroat trout. Known as "Turner Lake Chain".

TENAS LAKE: Shallow, productive lake. Inlet good spawning habitat.

RAINBOW LAKE (ungazetted lake upstream of Tenas, on Atnarko River): Long, narrow lake with inventory list plus cutthroat trout likely.

ELBOW LAKE (ungazetted and productive sharp-angled lake upstream of Rainbow Lake): Inventory stocks plus lamprey noted.

KNOT LAKES: Drain to Klinaklini River; long, narrow lakes (a) North Knot: kokanee suspected. Inlet is a silt-laden intentional diversion. Low productivity. (b) South Knot: inlet and outlet suitable for spawning, with rainbow trout and cutthroat trout. Isolated by falls from main river system.

Besides the lake and inlet/outlet fish resources detailed above and in Appendices 9.5 and 9.6, there are two major and one minor river systems partly within the Park, containing extremely important fish resources. These river systems, the Dean, Bella Coola and Talchako are described in Section 2.3.2.2.

APPENDIX 9.8 SALMON ESCAPEMENTS - DEAN & BELLA COOLA RIVERS

River	Salmon Species	1976 - 1985 Escapement - No. of fish/year Range (min-max) (thousands)(f)	Optimum Escapement/Yr (Fisheries & Oceans, Canada) (thousands)
Dean	Pink	2 - 17	35
	Chum	1 - 3.5 (a)	5
	Coho	1.5 - 5	10
	Chinook	0.5 - 4.5	12
	Sockeye	0.05 - 1.5	1.5
Bella Coola	Pink	? - 2300 (b)	1000
	Chum	10 - 70 (c)	80 (c)
	Coho	6 - 54 (d)	80
	Chinook	7.2 - 27.6	25
	Sockeye	18 - 50	75 (e)

NOTES:

(a) Visibility problems affect counting: figures are very approximate.

(b) Much difference between odd & even years, but evening out with each year. Very variable. 1985 run: 2,300,000; 1984 run: 650,000.

(c) Figures are totals of summer & fall runs. Optimum summer escapement: 60,000. Optimum fall escapement: 20,000.

(d) Late spawners are missed by counts - totals may be higher.

(e) Optimum levels occurred routinely in 1949 - 50's, and in 1973.

(f) Escapement = run, less harvest i.e. escapement to spawning grounds.

Source: Ben Mitchell-Banks, Fisheries & Oceans, Canada; Bella Coola (pers. comm.).

APPENDIX 9.9 ARCHAEOLOGICAL RESOURCES OF TWEEDSMUIR PARK AND AREA

9.9.1 Trails and Archaeological Sites identified as Affiliated with the Southern Carrier Indians

Fig. 3.A Ref. #	Site	Location	Features
1	Chikamin	Chikamin Portage	Indian Encampments. Portage. Not excavated
2	Baptiste	Tsacha Lake	3 semi-subterranean houses in good condition. Gibson Ranch
3	Canoe	Tsacha Lake	2 canoe forms in the ground 3 generations old. Not excavated
4	Iluak	Eliguk Lake	Old village site and cemetery 2 acre site. Irregular depressions Obsidian chips
5	Algatcho (Ulkatcho)	Gatcho Lake	Year-round village site Modern 240-grave Christian cemetery 20 houses, log cabins, schoolhouse. Inhabited until 1947 - decaying rapidly. Foundation of "Culla Culla House"
6	Mathews	Lot 13, Dean River	Rock-bottom crossing of Dean River at edge of the Park. Temporary Ulkatcho camp. Obsidian. Materials at National Museum.
7	Dorsey	3 sites around Tanya Lakes	Site of Lester Dorsey's base camp hunting cabin. Indian meeting places.
8	Rainbow	Rainbow Cabin	Rainbow Cabin (T. Walker) Indian encampments
9	Squiness	Squiness Fish Lake	25 m. long fish drying shed (ref. Kopas, 1976, p. 119)
	Grease Trails	n/a	Burnt Bridge Creek mouth to Fort Alexandria (Mackenzie Trail) Dean River to Pondosy Lake Kimsquit River to Eutsuk Lake Ulkatcho to lower Dean River

References: Parks Canada, 1976 and Kopas, 1976.

9.9.2 Archaeological Sites Identified as Affiliated with the Bella Coola Indians

Fig. 3.A Ref. #	Site	Location	Features
10	Hotnarko	Hotnarko R. mouth	Old smokehouse
11	?	5 km. east of Stuie	Pictographs
12	Stuie	(Shtooiht)	Old smokehouse, burial grounds
13	Nutteaux/ Nootkleia	Burnt Bridge Creek Mouth	Mackenzie's "Friendly Village" Large deserted village site. Post holes and mounds
14	Noosgulch (Nusqualtz)	Noosgulch River mouth	Abandoned village site. 10+ graves and ditch. Skeletal remains and burial box fragments
15	?	N. shore of Bella Coola River opposite Nusatsum River mouth	Petroglyphs
16	Thorsen Creek	Thorsen Creek	Petroglyphs - major site

Note: many others in Bentinck Arm.

References: Parks Canada, 1976.

APPENDIX 9.10 MINERAL CLAIMS SUMMARY

Mineral claims in effect within, or partly within the Park are summarized below, along with status information. General information on these claim blocks is in Section 5.1, while locations of claim blocks are shown on Figure 5.A.

Ashfork Mines Ltd.
Map Ref.: 92E/6-E & 7-W (Haven Lake area)
15 claims: CAFB 2,4,6-8,14,47,49,76,78,80,82,120(Fr.), 122(Fr.),165(Fr.)
Recording Dates: 1959-1966

Meteor Mining Ltd.
Map Ref.: 93E/2-E (Tesla Lake area)
58 claims: T1-T8, AT1-AT12, JAY 1 & 2,, M1-M36
Recording Dates: 1964-5

Adastral Mining Corp.
Map Ref.: 93E/2-E (Mt. Preston)
30 claims: Pond 1,3,6,7,8,10-27,41,43,48(Fr.),49,50
Recording Date: 1970

John Shelford
Map Ref.: 93E/2-E (Mt. Preston)
6 claims: Jam 1-6
Recording Date: 1966

R. A. Cubbon
Map Ref.: 93E/2-E (Mt. Preston)
2 claims: Bob 15 & 16
Recording Date: 1970

Stenecha Exploration Ltd.
Map Ref.: 93E/2-E (Rivers Peak N.)
57 claims: Bob 5-7,13,14,17,33. Ron 1-50
Recording Date: 1970

APPENDIX 9.11 TRAPLINES

The registered private traplines listed below exist within or partly within the Park. Information is presented on ownership and status. Locations of these trapline areas are shown in approximation on Figure 5.C. Other traplines exist in the Park under Crown ownership, or are vacant.

Fig. 5.C Code #	Trapline #	Owner	Park Use Permit?
1	0506T011	W. Escott, Anahim Lake	No
2	0508T012	R. Ratcliff, Bella Coola	No
3	0508T099	J. Shelton, Hagensborg	No
4	0510T000	H. Jack, Anahim Lake	No
5	0510T001	P. & J. Jack, Anahim Lake	No
6	0510T002	A. Cahoose, Anahim Lake	No
7	0510T003	J. Stillas, Anahim Lake	No
8	0510T004	Jimmy Stillas, Winfield	No
9	0510T005	R. Hennigar, Anahim Lake	#1650
10	0510T006	T. Cahoose, Anahim Lake	No
11	0510T007	P. West, Anahim Lake	No
12	0510T008	M. Squinas, Anahim Lake	No
13	0510T009	F. Sill & Co., Anahim Lake	No
14	0510T011	M. Sill, Anahim Lake	No
15	0512T021	B. Leon, Anahim Lake	No
16	0512T024	A Cahoose, Anahim Lake	No
17	0512T025	L. Cahoose, Anahim Lake	No
18	0601T008	T. Cahoose, Anahim Lake	No
19	0601T010	S. Haslett, Vanderhoof	No
20	0601T011	E. Sill, Anahim Lake	No
21	0602T002	A. Jack et al., Burns Lake	No
22	0602T003	Everett Jeffrey (A.H. Burt), Burns Lake	#755
23	0602T004	S. Skin et al., Burns Lake	No
24	0602T005	J. Shelford, Burns Lake	#850
25	0602T006	D. Harrison, Cassiar	#858
26	0604T043	E. Morris, Moricetown	No

APPENDIX 9.12 INHOLDINGS

The list below includes all the private property held in fee simple ownership within or partly within Tweedsmuir Park, as on 16 July 1986. Reference numbers refer to the map of private land locations, Figure 5.D.

Assessment Roll # and Legal Description	Owner	Fig. 5.D. Ref. # & Size (Hectares)
749-00463.000 NW 1/4 Sec. 28, TWP. 9	Corbould, Gordon K. Tweedsmuir Lodge, Stuie, via BELLA COOLA, B.C. V0T 1C0	Ref. #1 64.75 ha.
749-00464.000 SE 1/4 of NW 1/4 Sec. 33, TWP. 9 Sub. to R/W P. 2357	Corbould, Gordon K. Tweedsmuir Lodge, Stuie, via BELLA COOLA, B.C. V0T 1C0	Ref. #2 16.19 ha.
749-00464.500 SE 1/4, NE 1/4, Sec. 32, TWP. 9	Crown Canada Federal Fisheries OTTAWA, Ontario (Park Use Permit #455)	Ref. #3 16.19 ha.
749-00465.500 Parcel A, Pl. 7278 of SW 1/4 of Sec. 33, TWP. 9 except Lots 1 & 2, Plan 15366	Hayhurst, Kathleen Kuch, Dennis P.O. Box 108 Hagensborg, B.C. V0T 1H0	Ref. #4 2.68 ha.
749-00465.000 SW 1/4, Sec. 33, TWP. 9 except Pcl. A Plan 7278	Corbould, Gordon K. Tweedsmuir Lodge, Stuie, via BELLA COOLA, B.C. V0T 1C0	Ref. #5 51.80 ha.
749-00465.550 Lot 1, Sec. 33, TWP. 9 Plan 15366	Hayhurst, Kathleen Kuch, Dennis Box 10 RR 1 Bella Coola, B.C. V0T 1C0	Ref. #6 0.49 ha.
749-00465.600 Lot 2, Sec. 33, TWP. 9 Plan 15366	Siegel, Donald G. P. O. Box 366 Ketchum, Idaho, U.S.A. 83340	Ref. #7 0.42 ha.
749-00466.000 Frac. W 1/2 of SW 1/4 and NE 1/4 of SW 1/4 of Sec. 7, TWP. 10	Draney, Thomas S. Draney, Thomas P. P.O. Box 532 Bella Coola, B.C. V0T 1C0	Ref #8 49.37 ha.

APPENDIX 9.12 (continued):

Assessment Roll # and Legal Description	Owner	Fig. 5.D. Ref. # & Size (Hectares)
749-00225.000 Lot 1093 except reservations of timber, Prov. Crown	Stewart, Robert C. P. O. Box 6 Bella Coola, B.C. V0T 1C0	Ref. #9 35.97 ha.
749-00225.005 Lot 1, DL. 1093, Plan 28880, Range 3	Zimmerman, James. E. Zimmerman, Margaret E. 707 Larson Bldg. Yakima, Wash. U.S.A. 98901	Ref #10 23.71 ha.
749-00212.000 DL. 770, most wly 20 ch.	Northway, David M. 840 W 22nd Eugene, Oregon U.S.A. 97405 Denker, Dana W. P. O. Box 91 Hagensborg, B.C. V0T 1H0	Ref. #11 26.71 ha.
749-00251.000 Lot 1360	Widsten, Allen C. 4863 Cedar Cresc. Delta, B.C. V4M 1J9	Ref #12 8.09 ha.
749-00251.002 Lot 1385	Clarke, Charles P. 2000 Oxford Tower Edmonton, Alta. T5J 3G1	Ref. #13 20.24 ha.
749-00211.000 DL. 769	Edwards, Stanley B. P. O. Box 539 Bella Coola, B.C. V0T 1C0	Ref. #14 64.75 ha.
749-00213.000 DL. 774	Waterman, Lorna M. Box 255 Port Hardy, B.C. V0N 2P0 Ratcliff, Glen F. R. R. #1 Bella Coola, B.C. V0T 1C0 Larson, Mary N. Box 558 Bella Coola, B.C. V0T 1C0	Ref. #15 64.75 ha.

APPENDIX 9.12 (continued):

Assessment Roll # and Legal Description	Owner	Fig. 5.D. Ref. # & Size (Hectares)
749-00214.000 DL. 775	Waterman, Lorna M. Box 255 Port Hardy, B.C. V0N 2P0 Larson, Francis J. Box 558 Bella Coola, B.C. V0T 1C0	Ref. #16 65.56 ha.
749-00215.000 DL. 776	Same owners as for DL. 775	Ref. #17 32.38 ha.
749-00256.600 DL. 1741	Holloway, Rodney G. Friel, Sheila M. c/o Box 2246 Hope, B.C. V0X 1L0	Ref. #18 3.16 ha.
749-00173.000 Lot 121 except lots 1 & 2 Plan 14757	Edwards, John E. Box 308 Bella Coola, B.C. V0T 1C0	Ref. #19 56.69 ha.
749-00174.000 Lot 1, DL. 121, Plan 14757	Anderson, Martin c/o McCutcheon Firm Three Embarcadero Centre San Francisco, Calif. U.S.A. 94111	Ref. #20 1.13 ha.
749-00175.000 Lot 2 DL. 121, Plan 14757	Edwards, John E. Box 308 Bella Coola, B.C. V0T 1C0	Ref. #21 5.31 ha.
49-00181.003 S 1/2 of DL. 186 Range 3 Coast	Turner, Isabel G. Nimpo Lake Post Office Nimpo Lake, B.C. V0L 1R0	Ref. #22 64.75 ha.
749-00184.000 DL. 309	Mathews, Burtis E. Mathews, Nello M. Box 253 Garibaldi Highland, B.C.	Ref. #23 33.79 ha.
749-00224.000 DL. 1016 except R/W Dominion Telegraph Line	Same owners as for DL. 1574	Ref. #24 31.97 ha.

APPENDIX 9.12 (continued):

Assessment Roll # and Legal Description	Owner	Fig. 5.D. Ref. # & Size (Hectares)
749-00185.000 DL. 310 except 1 acre	Robson, George C. Box 282 Bella Coola, B.C. V0T 1C0 Robson, William G. Box 429 Bella Coola, B.C. V0T 1C0 Robson, James A. 9737 - 119th Grande Prairie, Alta. T8V 3P7	Ref. #25 34.40 ha.
749-00186.000 Part of DL. 310 containing 1 acre as shown on Plan 9680 S	Robson, James Robson, Dawn 9737 - 119th Grande Prairie, Alta. T8V 3P7	Ref. #26 0.40 ha.
749-00255.000 DL. 1574 shown on Plan 9680 S	Robson, George C. Box 282 Bella Coola, B.C. V0T 1C0 Robson, William G. Box 429 Bella Coola, B.C. V0T 1C0 Robson, James A. 9737 - 119th Grande Prairie, Alta. T8V 3P7	Ref. #27 21.04 ha.
749-00462.000 NW 1/4 Sec. 27 TWP. 9	Pacey, Grace S. 5975 Larch St. Vancounver, B.C. V6M 4E5 Pacey, Geoffrey 2000 - 65 Queen St. W. Toronto, Ont.	Ref. #28 64.75 ha.

APPENDIX 9.13 PARK USE PERMITS

P.U.P. #	Permittee	Purpose Area in Hectares	Expiry Date
386	Min. of Forests	Lookout (5 ha.)	31.3.87
389	Hunlen Wilderness Camp	Concession	31.3.87
469	Environment Canada	Water Recording & Cables	31.3.87
495	Tweedsmuir Ski Club	Cabin & Ski Tows	31.3.87
553	Blackwell, A.E.	Big Game Guiding	31.3.87
562	Williams, R.	Big Game Guiding	31.3.87
565	Van Tine, J.M.	Big Game Guiding	31.3.87
615	Canadian Wildlife Service	Storage Building & Dock (1 ha.)	31.3.87
629	Environment Canada	Cableway & Recorder	31.3.87
635	Crown Forest Ind. Ltd.	Access Road (2 ha.)	31.3.87
716	Environment Canada	Metering Bridge	31.3.87
726	Ulkatcho Indian Band	Smoke House	31.3.87
755	Burt, A.H.	Trapping	31.3.87
778	Van Tine, J.M.	Tourist Camps & Commercial Guiding (1 ha.)	31.3.87
782	Turner, J.	Grazing	31.3.87
839	Min. of Highways	2 Gravel Pits (2 ha.)	31.3.87
850	Shelford, J.C.	Trapping	31.3.87
855	Edwards, J.	Commercial Guiding	30.4.87
858	Harrison, D.S.	Trapping & trapping cabin	31.3.87
879	Blackwell, A.	5 Tourist Camps & Commercial Guiding (7 ha.)	31.5.87
987	Min. of Environment	Snow Course	31.3.87
1006	Kuch, D. & Hayhurst, K.	Commercial Guiding	30.4.87
1020	Kluber, C.	Fishing Camp	31.3.87
1120	Blackwell, J.	Big Game Guiding	31.3.86
1124	Fisheries & Oceans, Canada	Cabin	31.3.87
1135	Fish & Wildlife	Spawning Platforms	31.3.87
1157	Stewart, R.	Commercial Guiding	28.2.87
1177	Dubuc, L.	Tent Camp & Angling Guiding (1 ha.)	31.5.87
1180	Aluminum Co. of Canada	Reservoir Clearing	31.3.87
1202	Min. of Forests	Helipad & Tool Cache (1 ha.)	31.3.87
1259	Stewart, R.	Waterline (1 ha.)	31.3.87
1267	Koroluk, L.	Commercial Guiding	31.5.87
1338	B.C. Hydro	Distribution Line (11 ha.)	31.3.87
1350	Min. of Forests	Repeater Station (1 ha.)	31.3.87

APPENDIX 9.13 (continued):

P.U.P. #	Permittee	Purpose Area in Hectares	Expiry Date
1553	Min. of Trans. & Highways	Radio Repeater	31.3.87
1574	Min. of Trans. & Highways	Highway Right-of-way (49 ha.)	31.3.87
1584	Min. of Trans. & Highways	Gravel Pit	31.3.87
1600	Tweedsmuir Horse Guiding	Concession	31.1.91
1650	Hennigar, R.	Trapping	31.3.87
1660	Fisheries & Oceans, Canada	Spawning Channel	31.3.87

APPENDIX 9.14 TRAILS & HIGHWAY DESCRIPTIONS

The Park contains about 630 kilometers of trails, in various states of upkeep, and a 57 kilometer stretch of highway.

The following sections describe these trails, which are grouped into geographical areas, and then detailed in a north to south or west to east sequence across these areas.

Abbreviations: km - kilometers
AMHT - Alexander Mackenzie Heritage Trail

Ootsa Lake South Shore

a) OOTSA - WHITESAIL: from opposite Wistaria Landing and from opposite Ootsa Landing (2 trails) south to Glatheli Lake - Fenton Lake - Goodrich Lake, then northwest to Whitesail Reach. Hunting trail. (70 km)

b) GLATHELI LAKE - BLANCHET LAKE: from Glatheli Lake southeast along Chelaslie River to Chief Louis Lake (Park boundary), thence southwest to Blanchet Lake. Hunting trail. (47 km)

Note: There are no apparent trail connections to areas further south.

Whitesail Lake South Shore

a) CHIKAMIN BAY - ST. THOMAS BAY: trail and narrow-gauge railway track portage connects Whitesail and Eutsuk Lakes. (1/2 km)

b) ZINC BAY - CHIKAMIN MOUNTAIN alpine area. Old mining road. (5 km)

c) LAKE - LINDQUIST PEAK: southwest arm to Kenney Lake and on to Lindquist Peak alpine area. Old mining road. (14 km)

Eutsuk Lake

a) SUREL: west arm to Surel Lake and falls. (3 km)

b) MUSCLOW: west arm to Musclow Lake. Fishing trail for boaters. (3 km)

c) RED BIRD MTN.: Bone Creek mouth (near John Buchan Is.) to Red Bird Mtn. Mining road. (18 km)

d) SIGUTLAT LAKE: Connelly Bay southeast to Nahlouza Lake then south to Sigutlat Lake. Hunting Trail. (42 km)

Note: There are no apparent trail connections to areas further north or south.

Between Dean River and Highway 20

a) ALEXANDER MACKENZIE HERITAGE TRAIL (AHMT) (grease trail), Ulkatcho - Burnt Bridge Creek: southwest from Ulkatcho abandoned Indian village (outside Park) - Squiness Lake - Tanya Lakes, then south via Mackenzie Valley and Pass, thence southwest to Fish Lake (near Tine Hill). From Fish Lake south to Bella Coola Valley at Burnt Bridge Creek picnic ground, via either a descent outside the Park and west of the Creek, or via the viewpoint loop trail east of the Creek inside the Park. Well marked grease/tourist trail. (86 km)

b) DEAN RIVER GREASE TRAIL, Ulkatcho - Dean River: follows AMHT southwest from Ulkatcho, then turns west beyond Tanya Lakes to Salmon House Falls (mouth of Takia River) at Park boundary. (58 km)

APPENDIX 9.14 (continued):

c) SLOUGH GRASS 'SUMMER' TRAIL (ULKATCHO TRAIL), Tanya Lakes - Fish Lake: deviation from AMHT, heads southwest from Tanya Lakes (avoids Mackenzie Valley & Pass), then south along Tahyesco River to rejoin AMHT at Fish Lake. (40 km). Dead-end branch trail goes west from approximate mid-point of trail to Talcheazoone Lake (outside Park). (23 km)

d) ULKATCHO SUMMER TRAIL, Fish Lake - Canoe Crossing: continuation of c) above. Runs west then south from Fish Lake down into Bella Coola Valley at Canoe Crossing (Highway 20 bridge over Bella Coola River). Occasionally indistinct grease trail. (18 km)

e) CAPOOSE SUMMER TRAIL (SITKATAPA & OCTOPUS LAKE TRAILS), Fish Lake - East Bridge: continuation of d) above. Follows AMHT from Fish Lake northeast to Sitkatapa Lake, thence east to Octopus Lake and East Branch picnic ground. Indistinct in parts. (35 km)

f) TWEEDSMUIR TRAIL, Mosher Creek - Rainbow Cabin: runs south from Rainbow Cabin (near Mackenzie Pass on AMHT) to Octopus Lake and on to Highway 20 at Mosher Creek. Built in 1937 to commemorate visit of Governor-General Lord Tweedsmuir. Many indistinct sections, except near Mosher Creek. (36 km)

g) BEEF TRAIL CREEK TRAIL, Rainbow Cabin - Upper Dean River: runs northeast from Rainbow Cabin, then east along Beef Trail Creek and continues beyond Park to Upper Dean River. (40 km). South loop branch runs parallel between Rainbow Cabin and the Creek, about 8 km. further south. Both trails indistinct in alpine sections.

h) RAINBOWS TRAIL, Beef Trail Creek - East Branch: runs south from Beef Trail Creek to East Branch picnic ground past "the Molar' viewpoint. Indistinct in open alpine country of northern section. (18 km)

i) HIGHWAY 20, Burnt Bridge - Heckman Pass: generally west-east along Atnarko Valley, Young Creek and through Heckman Pass towards Anahim Lake and Williams Lake. Unpaved. (57 km in Park)

South of Highway 20

a) STUIE TRAILS. From Highway 20 near Talchako Lodge. (i) Esker Trail runs west from the lodge to Atnarko River. (ii) Confluence Trail from end of (i) to confluence of Atnarko and Talchako Rivers. (iii) Kettle Lake Trail south of highway near Big Rock Picnic Ground. (all short trails)

b) CARIBOU MOUNTAIN TRAIL, Stuie - Ptarmigan lake: Stuie across old logging bridge then southeast along Tsill Creek to falls, north of Caribou Mountain to Ptarmigan lake. Indistinct past falls. (20 km)

c) ATNARKO TOTE ROAD / TURNER LAKES TRAIL, Young Creek - Ptarmigan Lake: from Young Creek campground southeast on tote road (trail) along Atnarko River, then south along trail after Hotnarko footbridge, thence southwest from Stillwater Lake to Turner Lake primitive campground. (29 km)

d) SUGAR CAMP TRAIL, Atnarko - Anahim Lake: northeast up Sugar Camp Creek from Atnarko tote road at mouth of Creek, then east to Hotnarko River and northeast beyond Park to Anahim Lake. Well-marked. (50 km).
Branch continues northeast along Sugar Camp Creek, then beyond Park boundary to Precipice Creek (Precipice Trail) (10 km)

e) HOTNARKO (TELEGRAPH LINE) TRAIL: At end of Atnarko tote road (confluence of Atnarko and Hotnarko Rivers) up lower Hotnarko River to join Sugar Camp Trail near Park boundary. In poor condition, route of former Dominion Telegraph line. (6 km)

APPENDIX 9.15 HIGHWAY TRAFFIC COUNTS

Highway 20 - 5 km. S.W. of Williams Lake
09:50 - 10:50 Tuesday 16.7.86

Vehicle, Group A	12	15%
Vehicle, Group B	3	4%
Vehicle, Group C	36	44%
Vehicle, Group D	30	37%
TOTAL	81	100%
Tourist Traffic (A + B)	15	19%
Non-Tourist Traffic (C + D)	66	81%

Comparable Ministry of Transportation and Highways
Traffic Volume (1983): 1100/day

Highway 97 - 5 km. E. of Williams Lake
11:15 - 12:15 Tuesday 16.7.86

Vehicle, Group A	149	36%
Vehicle, Group B	68	16%
Vehicle, Group C	152	36%
Vehicle, Group D	48	12%
TOTAL	417	100%
Tourist Traffic (A + B)	217	52%
Non-Tourist Traffic (C + D)	200	48%

Comparable Ministry of Transportation and Highways
Traffic Volume (1983): 5800/day

NOTE:
- Group A: Tourist cars, light vans & pickups.
- Group B: Recreation Vehicles, including motorhomes, camper-vans, 5th-wheel & travel trailers, camper trucks.
- Group C: Non-Tourist cars, light vans & pickups.
- Group D: Commercial heavy vans & trucks.

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